

AD-A061 994

BOEING VERTOL CO PHILADELPHIA PA

F/6 1/3

INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONF--ETC(U)

SEP 78 P F SHERIDAN

DAAJ02-77-C-0020

UNCLASSIFIED

USARTL-TR-78-23F

NL

1 OF 4  
AD  
A061994



USARTL-TR -78-23F

**LEVEL**

VOL III B

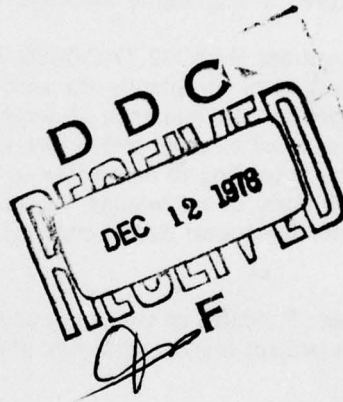
A061766



**INTERACTIONAL AERODYNAMICS OF THE SINGLE  
ROTOR HELICOPTER CONFIGURATION**

**VOLUME VI-A - One-Third Octave Band Spectrograms of  
Wake Single Film Data, Bildup to Baseline**

Philip F. Sheridan  
Boeing Vertol Company  
P.O. Box 16858  
Philadelphia, Pa. 19142



September 1978

Final Report for Period March 1977 - February 1978

Approved for public release;  
distribution unlimited.

Prepared for

APPLIED TECHNOLOGY LABORATORY  
U. S. ARMY RESEARCH AND TECHNOLOGY LABORATORIES (AVRADCOM)  
Fort Eustis, Va. 23604

78 12 08 040

DDC FILE COPY ADA061994



## APPLIED TECHNOLOGY LABORATORY POSITION STATEMENT

In 1975 a wind tunnel test program was conducted in the Boeing-Vertol 20-foot V/STOL Wind Tunnel on a 1/5th-scale UTTAS model to investigate and find solutions for several aerodynamic problems encountered during the UTTAS flight-testing. Specifically, these tests focused upon (a) the structure of the hub/rotor wake in the vicinity of the empennage, (b) the formulation of the ground vortex and its relation to hub loads and fuselage loads during transition, and (c) the occurrence of vibratory air pressures from the blade passing over the fuselage. Only portions of the above-mentioned wind tunnel test data were reduced and analyzed in addressing the flight-test problems of the UTTAS aircraft.

Under Contract DAAJ02-77-C-0020, Boeing-Vertol completed analyses on the data to understand more completely the aerodynamic interactions that are involved and to formulate instructions for the guidance of designers in these respects. The results of these studies are applicable to all existing and future single-rotor/tail rotor helicopters. The data have been segregated according to aerodynamic interactions and associated phenomena/problem areas. From this body of knowledge, a generalized set of design guidelines meaningful to the single-rotor helicopter design concept formulation were developed and are included in these reports.

Mr. Robert P. Smith of the Aeronautical Technology Division, Aeromechanics Technical Area, served as project engineer for this effort.

### DISCLAIMERS

The findings in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission, to manufacture, use, or sell any patented invention that may in any way be related thereto.

Trade names cited in this report do not constitute an official endorsement or approval of the use of such commercial hardware or software.

### DISPOSITION INSTRUCTIONS

Destroy this report when no longer needed. Do not return it to the originator.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

19 REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM													
18 REPORT NUMBER USARTL-TR-78-23F	2. GOVT ACCESSION NO.	3. REPORT'S CATALOG NUMBER 9													
6 TITLE (and Subtitle) INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFIGURATION. Volume VI, One-Third Octave Band Spectrograms of Wake Single Film Data, Sub-Volume A, Buildup to Baseline.		5. TYPE OF REPORT & PERIOD COVERED FINAL REPORT, 15 Mar 1977 - 13 Feb 1978.													
7 AUTHOR(s) Philip F. Sheridan	8. CONTRACT OR GRANT NUMBER(s) DAAJ02-77-C-0020	6. PERFORMING ORG. REPORT NUMBER													
9. PERFORMING ORGANIZATION NAME AND ADDRESS Boeing Vertol Company P.O. Box 16858 Philadelphia, Pa. 19142		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62209A 1L262209AH76 00189 EK													
11. CONTROLLING OFFICE NAME AND ADDRESS Applied Technology Laboratory, US Army Research and Technology Laboratories (AVRADCOM) Fort Eustis, Va. 23604		12. REPORT DATE September 1978													
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) 302p.		13. NUMBER OF PAGES 301													
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		15. SECURITY CLASS. (of this report) Unclassified													
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)															
18. SUPPLEMENTARY NOTES Volume VI of an eight-volume report. Volume VI is comprised of three sub-volumes (A thru C)															
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)															
<table border="0"> <tr> <td>Wake</td> <td>Interaction</td> <td>Empennage</td> </tr> <tr> <td>Flow</td> <td>Aerodynamic Interaction</td> <td>Flow Modifier</td> </tr> <tr> <td>Frequency</td> <td>Flow Environment</td> <td>Powered Model</td> </tr> <tr> <td>Spectrum</td> <td>Configuration</td> <td></td> </tr> </table>				Wake	Interaction	Empennage	Flow	Aerodynamic Interaction	Flow Modifier	Frequency	Flow Environment	Powered Model	Spectrum	Configuration	
Wake	Interaction	Empennage													
Flow	Aerodynamic Interaction	Flow Modifier													
Frequency	Flow Environment	Powered Model													
Spectrum	Configuration														
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This is the first of the three volumes of Volume VI containing one-third octave band spectrograms of the model helicopter hub/rotor wake velocities derived from the single-film velocity transducer data. This sub-volume deals with the wake changes as the model is built up to the baseline configuration.															

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

78 12 08 040  
403 682  
J/B

## PREFACE

The entire report describing the investigation of INTERACTIONAL AERODYNAMICS OF THE SINGLE-ROTOR HELICOPTER CONFIGURATION comprises eight numbered volumes bound as 33 separate documents. The complete list of these documents is as follows:

### Volume I, Final Report

### Volume II, Harmonic Analyses of Airframe Surface Pressure Data

- A — Runs 7-14, Forward Section
- B — Runs 7-14, Mid Section
- C — Runs 7-14, Aft Section
- D — Runs 15-22, Forward Section
- E — Runs 15-22, Mid Section
- F — Runs 15-22, Aft Section
- G — Runs 23-33, Forward Section
- H — Runs 23-33, Mid Section
- I — Runs 23-33, Aft Section

### Volume III, Flow Angle and Velocity Wake Profiles in Low-Frequency Band

- A — Basic Investigations and Hubcap Variations
- B — Air Ejector Systems and Other Devices

### Volume IV, One-Third Octave Band Spectrograms of Wake Split-Film Data

- A — Buildup to Baseline
- B — Basic Configuration Wake Explorations
- C — Solid Hubcaps
- D — Open Hubcaps
- E — Air Ejectors
- F — Air Ejectors With Hubcaps; Wings
- G — Fairings and Surface Devices

### Volume V, Harmonic Analyses of Hub Wake

### Volume VI, One-Third Octave Band Spectrograms of Wake Single Film Data

- A — Buildup to Baseline
- B — Basic Configuration Wake Exploration
- C — Hubcaps and Air Ejectors

### Volume VII, Frequency Analyses of Wake Split-Film Data

- A — Buildup to Baseline
- B — Basic Configuration Wake Explorations
- C — Solid Hubcaps

This volume is

ACCESSION for	
NTIS	White Section
DDC	Buff Section
UNANNOUNCED	
JUSTIFICATION	
BY	
DISTRIBUTION/AVAILABILITY CODES	
DEL	SPECIAL

A

- D - Open Hubcaps
- E - Air Ejectors
- F - Air Ejectors With Hubcaps; Wings
- G - Fairings and Surface Devices

**Volume VIII, Frequency Analyses of Wake Single Film Data**

- A - Buildup to Baseline
- B - Basic Configuration Wake Exploration
- C - Hubcaps and Air Ejectors



## TABLE OF CONTENTS

	<u>PAGE</u>
INTRODUCTION . . . . .	6
OUTLINE OF WAKE INVESTIGATIONS (TABLE 1). . . . .	7
LIST OF TEST RUNS (TABLE 2) . . . . .	11
INDEX TO RAKE POSITIONS (TABLE 3) . . . . .	18
RAKE ORIENTATION DIAGRAM (FIGURE 1) . . . . .	24
HOT FILM RAKE LOCATIONS (FIGURE 2-6) . . . . .	25
UTTAS 1/4.85 - SCALE MODEL GEOMETRY AND PRESSURE TRANSDUCER LOCATIONS (FIGURE 7) . . . . .	30
ONE THIRD OCTAVE BAND IDENTIFICATION (TABLE 4). . . . .	31
SINGLE-FILM 1/3 OCTAVE BAND CHARTS . . . . .	32



## INTRODUCTION

Volume VI presents spectrograms of the six velocity measurements from the single film transducers which were located outboard on the wake rake to the left and right of the split film transducers. These plots are similar to those of Volume IV E, being machine plotted spectrograms in the one-third octave band format. They relate directly to the standard spectrograms that appear in Volume VIII for the same set of runs.

The sub-volumes of Volume VI display data derived from the following test runs:

Volume VI-A -	149, 150, 160, 156, 158, 159
Volume VI-B -	111 -119, 121,
Volume VI-C -	135, 136, 188, 211, 168, 167, 194, 161, 154, 172, 174, 176, 203, 205, 197

The runs follow the order of the logical arrangement of the Outline of Wake Investigations, Table 1, from which they have been selected. The Table I outline and other material is included for reference and as context to the work of each sub-volume. Table 2, the List of Test Runs, arranges the runs in numerical order and gives pertinent text parameters.

The Index of Rake Positions, Table 3, lists the hot film transducer rake positions in the model coordinate system for each run and its test points. The main feature of Table 3 is the indexing of the test point number to the model water line station and butt line as it varied from run to run. The table groups the runs as they shared the indexing correspondence of point with position. It is emphasized that the runs in a group do not necessarily all share the same number of test points but they do have same correspondence within their respective ranges of test points.

The orientation of the rake is shown pictorially in Figures 1 through 6 for the various test runs. Figure 7 presents a scaled drawing of the model with reference to the three-axis coordinate system. Table 4 lists the center frequency and the upper and lower band limits for each of the numbered one-third octave bands.

TABLE 1			
OUTLINE OF WAKE INVESTIGATIONS			
Description	Configuration Code	Run No.	Base-line
<u>Build-up to Baseline</u>			
1. Nacelles removed	$K_{13}+H_1-N$	149	150
2. Blades off, rotating hub	$K_{13}-M+H_{1.0}$	160	156
3. " " , non-rotating hub	$K_{13}-M+H_{1.0}$	158	156
4. " " , hub off	$K_{13}-M-H_{1.0}$	159	156
<u>Basic Configuration</u>			
1. <u>Wake Explorations near Empennage</u>			
(a) 15" Long. + traverse at T/R C.L.	$K_{11}$	111	---
(b) 9" Vert. + " above T/R "	"	112	---
(c) 2" " " in vortex	"	113	---
(d) 8" " " (continue 112)	"	114	---
(e) 13" " " behind stab.	"	115	---
(f) Lateral traverse, left stab. (One T.P. only)	"	116	---
(g) Same continued	"	117	---
(h) Same continued (One T.P. only)	"	118	---
(i) Lateral traverse right stab.	"	119	---
(j) T/R effect on wake	$K_{11}+T_2^0$	121	115
2. <u>Climb/Descent Studies</u>			
(a) Climb 900 FPM	$K_{11}$	135	---
(b) Descent 800 FPM	"	136	---
<u>Effect Of Hub Caps</u>			
1. <u>Solid Caps on Canister</u>			
(a) 7.6" diam. 2.17" ht. soft Pitch Arms	$K_{11}-H_{1.0}+H_{1.2}$	137	136
(b) 7.6" diam. 2.17" ht. stiff Pitch Arms	$K_{13}+H_{1.2}$	153	156
(b) 7.6" diam. 2.45" ht. flt. test config.	$K_{13}+H_{1.2.1}+I_1$ $+E_{1.0}$	207	188

TABLE 1 (CONTINUED)

## OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
<u>Effect of Hub Caps (Continued)</u>			
2. <u>Solid Caps Raised Above Canister</u>			
(a) 7.6" diam. 2.45" ht. 70" depth, .55 gap	H <sub>1.2.2</sub> +I <sub>1</sub> +E <sub>1.0</sub>	208	188
(b) 10.0" diam. 3.25" ht. 1.55" depth, .50" gap	H <sub>1.8.1</sub> +I <sub>1</sub> +E <sub>1.0</sub>	189	188
(c) 10.0" diam. 4.125" ht. 2.05" depth, .875" gap	H <sub>1.8.2</sub> +I <sub>1</sub> +E <sub>1.0</sub>	190	188
(d) Repeat of 189	" " "	210	188
3. <u>Open Caps Without Underbody</u>			
(a) 10.0" diam. 1.25" gap, blades	H <sub>1.0.2</sub> +I <sub>1</sub> +E <sub>1.0</sub>	193	188/166
(b) " " " gap, no blades	H <sub>1.0.1</sub> -M	166	158
(c) " " 2.05" gap, blades	H <sub>1.14.1</sub> +I <sub>1</sub> +E <sub>1.0</sub>	211	188
(d) " " 1.75" gap, no blades	H <sub>1.0.1</sub> -M	165	158
(e) " " 1.87" gap, blades	H <sub>1.0.3</sub> +I <sub>1</sub> +E <sub>1.0</sub>	191	188
(f) 16" diam. 2.00" gap, blades	H <sub>1.7.1</sub>	168	156/167
(g) " " " gap, no blades	H <sub>1.7.1</sub> -M	167	158
(h) " " 4.00" gap, blades	H <sub>1.7.2</sub>	169	156
4. <u>Open Caps with Underbody</u>			
(a) 7.6" diam. 1.25" gap	H <sub>1.11.1</sub> +I <sub>2</sub> +E <sub>1.0</sub>	194	188
(b) " " " "	H <sub>1.11.1</sub> +I <sub>2</sub> +E <sub>4.0</sub>	198	188
(c) " " " " center post	H <sub>1.11.2</sub> +I <sub>2</sub>	202	194
(d) 10.0" diam. .5" gap, no blades	H <sub>1.5.1</sub> -M	164	158
(e) " " 1.25" gap, no blades	H <sub>1.5.2</sub> -M	161	158
(f) " " 2.0" gap, no blades	H <sub>1.5.4</sub> -M	163	158
(g) " " 4.0" gap, no blades	H <sub>1.5.3</sub> -M	162	158
(h) " " 1.25" gap	H <sub>1.5.2</sub>	154	156/161
*Basic Code is K13.			

TABLE 1 (CONTINUED)

## OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
<u>5. Miscellaneous Hub Covers</u>			
(a) Hub fairing 16" diam.	H <sub>1.3</sub>	151	150
(b) Wham-O-Frisbee 10" diam.	H <sub>1.9.0</sub> +E <sub>1.2</sub>	182	181
(c) Fab. glass Frisbee 16" diam.	H <sub>1.9.1</sub> +E <sub>1.2</sub>	183	181
<u>Effect of Air Ejectors</u>			
1. Basic system no blowing	H <sub>1.0</sub> +E <sub>1.0</sub>	172	156
2. " " 40 psi	" "	173	156/172
3. " " 150 psi	" "	174	156/172
4. Wide chord shroud 40 psi	H <sub>1.0</sub> +E <sub>2.5.1</sub>	175	156/173
5. Wide " " 150 psi	" "	176	156/174
6. W/C shroud w. lip 40 psi	H <sub>1.0</sub> +E <sub>3.5.2</sub>	184	156/173
7. Same Contoured Parallel 150 psi	H <sub>1.0</sub> +E <sub>3.5.4</sub>	187	156/174
8. Bifurcated duct 0 psi	H <sub>1.0</sub> +E <sub>5.0</sub>	203	156
9. " " 40 psi	" "	204	156/203
10. " " 150 psi	" "	205	156/203
<u>Air Ejectors with Open Hub Caps with Underbodies</u>			
1. 7.6" diam. 1.25" gap, 0 psi	H <sub>1.11.1</sub> +I <sub>2</sub> +E <sub>1.0</sub>	194	188/172
2. " " " " 20 psi	" " "	195	188
3. " " " " 40 psi	" " "	196	188/173
4. " " " " 150 psi	" " "	197	188/174
5. " " " " 0 psi	H <sub>1.11.1</sub> +I <sub>2</sub> +E <sub>4.0</sub>	198	188/194
6. " " " " 40 psi	" " "	199	188/196
7. " " " " 150 psi	" " "	200	188/196
8. Same with center post	H <sub>1.11.2</sub> +I <sub>2</sub> +E <sub>4.6</sub>	201	188/200
9. 10.0" diam. 2.0" gap wide ch'd. shroud (150 psi)	H <sub>1.5.4</sub> +E <sub>2.5.1</sub>	177	156/176
<u>Effect of Wings and Misc.</u>			
1. Wings			
(a) Nacelle-mounted stub wing	H <sub>1.0</sub> +W <sub>1.0</sub> +E <sub>1.1</sub>	178	181
(b) Single slotted flapped wing	H <sub>1.0</sub> +W <sub>3.0</sub> +E <sub>1.0</sub>	180	181
(c) Double slotted flapped wing	H <sub>1.0</sub> +W <sub>2.0</sub> +E <sub>1.0</sub>	179	181
(d) Boom-mounted stub wing	H <sub>1.0</sub> +W <sub>4.0</sub>	186	156
*Basic Code is K13.			



TABLE 1 (CONTINUED)

## OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
2. Crown Fairings			
(a) Flat top behind shaft	$K_{11}+D_1$	140	138
(b) Round top behind shaft	$K_{11}+D_2$	141	138
(c) Extended flat top fairing	$H_1+D_4$	170	156
(d) Flat top + 16" cap, 4" gap	$H_{1.7.2}+D_4$	171	170
(e) Forward fairing/nacelle fairing	$P_{1.0}$	152	156
3. Surface Devices			
(a) Vortex generators	$K_{11}+VG_{2.1}$	139	138
(b) Guidevane between nacelles	$K_{11}+FV_1$	142	138
(c) Longitudinal strakes	$H_{1.5.3}+S_4$	155	156
(d) 14% porosity spoiler	$K_{11}+X_1$	143	138
*Basic Code is K13 unless noted otherwise.			



TABLE 2  
LIST OF TEST RUNS  
BASIC INVESTIGATIONS OF THE HUB WAKE

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					$\alpha^\circ$	$\psi^\circ$		
111	K <sub>11</sub> /15" Long. wake traverse at TR center line	80	1433/0	8	6.0	-2.0	$\infty$	Off
112	" /9" Vert. wake traverse above TR center line	"	"	"	"	"	"	"
113	" /2" Vert traverse through MR vortex	"	"	"	"	"	"	"
114	" /8" Vert. traverse below TR center line	"	"	"	"	"	"	"
115	" /13" Vert. traverse behind stabilizer	"	"	"	"	"	"	"
116	" /Lateral traverse - left stabilizer	"	"	"	"	"	"	"
117	" /116 continued	"	"	"	"	"	"	"
118	" /116 continued	"	"	"	"	"	"	"
119	" /Lateral traverse - right stabilizer	"	"	"	"	"	"	"
121	K <sub>11</sub> +T <sub>2</sub> /Effect of tail rotor flow on wake	"	1433/4500	"	"	"	"	On
135	K <sub>11</sub> /Wake in 900 fpm climb	"	"	"	-6.0	-4.5	"	Off
136	" /Wake in 800 fpm descent	"	"	"	6.0	-2.0	"	"

TABLE 2 (CONTINUED)

**LIST OF TEST RUNS**  
EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					$\alpha^\circ$	$\psi^\circ$		
137	K <sub>11</sub> -H <sub>1.0</sub> +H <sub>1.2</sub> /Effect of 7.6 inch diam. solid hub cap	80	1433/0	8	6	-3.8	$\infty$	Off
138	K <sub>11</sub> /Repeat of base run	"	"	"	"	"	"	"
139	K <sub>11</sub> +VG <sub>2.1</sub> /Effect of vortex generators on aft crown	"	"	"	"	"	"	"
140	K <sub>11</sub> +D <sub>1</sub> /Flat-topped "doghouse" fairing on aft crown	"	"	"	"	"	"	"
141	K <sub>11</sub> +D <sub>2</sub> /Rounded-top fairing	"	"	"	"	"	"	"
142	K <sub>11</sub> +FV <sub>1</sub> /Deflection vane on crown between nacelles	"	"	"	"	"	"	"
143	K <sub>11</sub> +X <sub>1</sub> /Variable porosity spoiler	"	"	"	"	"	"	"
149	K <sub>13</sub> +H <sub>1</sub> -N <sub>1</sub> /Effect of nacelles off also add stiff pitch arms (K <sub>13</sub> )	60	1075/0	4.5	"	"	"	"
150	K <sub>13</sub> +H <sub>1</sub> /60 knot baseline	"	"	"	"	"	"	"
151	K <sub>13</sub> +H <sub>1.3</sub> /16 inch diam. helmet fairing	"	"	"	"	"	"	"
152	K <sub>13</sub> +P <sub>1.0</sub> /Pylon and intake fairings	80	1433/0	8	"	"	"	"
153	K <sub>13</sub> +H <sub>1.2</sub> /Repeat 137 with K <sub>13</sub> pitch arms	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

## LIST OF TEST RUNS

## EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V <sub>TUN</sub> KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					$\alpha^\circ$	$\psi^\circ$		
154	K <sub>13</sub> +H <sub>1.5.2/10</sub> " open hub cap, 7" underbody, 1.25" gap	80	1433/0	8	6	-3.8	$\infty$	Off
155	K <sub>13</sub> +H <sub>1.5.2</sub> +S <sub>4</sub> /Same as 154 except strakes on aft crown	"	"	"	"	"	"	"
156	K <sub>13</sub> +H <sub>1.0</sub> /Baseline with K <sub>13</sub> , i.e., stiff pitch arms	"	"	"	"	"	"	"
158	K <sub>13</sub> -M+H <sub>1.0</sub> /Wake studies with blades off, hub not rotating	"	0/0	"	"	"	"	"
159	K <sub>13</sub> -M-H <sub>1.0</sub> /Wake studies with hub off	"	"	"	"	"	"	"
160	K <sub>13</sub> -M+H <sub>1.0</sub> /Same as 158 except hub is rotating	"	1433/0	"	"	"	"	"
161	K <sub>13</sub> -M+H <sub>1.5.2</sub> /Repeat of 154 without blades	"	0/0	"	"	"	"	"
162	K <sub>13</sub> -M+H <sub>1.5.3</sub> /Same as 161 except 4" gap	"	"	"	"	"	"	"
163	K <sub>13</sub> -M+H <sub>1.5.4</sub> /Same as 161 except 2" gap	"	"	"	"	"	"	"
164	K <sub>13</sub> -M+H <sub>1.5.1</sub> /Same as 161 except 0.5" gap	"	"	"	"	"	"	"
165	K <sub>13</sub> -M+H <sub>1.0.1/10</sub> " open hub cap, no underbody, same cap vert. position as Run 154	"	"	"	"	"	"	"
166	K <sub>13</sub> -M+H <sub>1.0.2</sub> /Same as 165 with cap lowered by 0.5"	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)  
LIST OF TEST RUNS  
EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					$\alpha^\circ$	$\psi^\circ$		
167	K <sub>13</sub> -M+H <sub>1.7.1</sub> /16" open cap, no underbody, 2" gap	80	0/0	8	6	-3.8	$\infty$	Off
168	K <sub>13</sub> +H <sub>1.7.1</sub> /Blades on, same cap config. as 167	"	1433/0	"	"	"	"	"
169	K <sub>13</sub> +H <sub>1.7.2</sub> /16" open cap, no underbody, 4" gap	"	"	"	"	"	"	"
170	K <sub>13</sub> +H <sub>1.0</sub> +D <sub>4.0</sub> /Extended flat top fairing on aft crown	"	"	"	"	"	"	"
171	K <sub>13</sub> +H <sub>1.7.2</sub> +D <sub>4.0</sub> /Same fairing as 170, same cap as 169	"	"	"	"	"	"	"
172	K <sub>13</sub> +H <sub>1.0</sub> +E <sub>1.0</sub> (0psi)/Basic air ejector zero blowing baseline	"	"	"	"	"	"	"
173	K <sub>13</sub> +H <sub>1.0</sub> +E <sub>1.0</sub> (40 psi)/Same as 172 with 40 psi supply	"	"	"	"	"	"	"
174	K <sub>13</sub> +H <sub>1.0</sub> +E <sub>1.0</sub> (150 psi)/Same as 172 with 150 psi supply	"	"	"	"	"	"	"
175	K <sub>13</sub> +H <sub>1.0</sub> +E <sub>2.5.1</sub> (40 psi)/Ejector with wide chord shroud at 40 psi	"	"	"	"	"	"	"
176	K <sub>13</sub> +H <sub>1.0</sub> +E <sub>2.5.1</sub> (150 psi)/Same as 174 with 150 psi supply	"	"	"	"	"	"	"
177	K <sub>13</sub> +H <sub>1.5</sub> +E <sub>2.5.1</sub> (150 psi)/Same as 176 with 10" cap like 163	"	"	"	"	"	"	"
178	K <sub>13</sub> +H <sub>1.0</sub> +W <sub>1.0</sub> +E <sub>1.1</sub> (0 psi)/Nacelle mounted wing	"	"	"	"	"	"	"



TABLE 2 (CONTINUED)  
LIST OF TEST RUNS  
EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					$\alpha^\circ$	$\psi^\circ$		
179	K <sub>13</sub> +H <sub>1.0</sub> +W <sub>2.0</sub> +E <sub>1.0</sub> (0 psi)/Double slotted flapped wing	80	1433/0	8	6	-3.8	$\infty$	Off
180	K <sub>13</sub> +H <sub>1.0</sub> +W <sub>3.0</sub> +E <sub>1.0</sub> (0 psi)/Single slotted flapped wing	"	"	"	"	"	"	"
181	K <sub>13</sub> +H <sub>1.0</sub> +E <sub>1.2</sub> (0 psi)/Baseline with ejector tube moved aft	"	"	"	"	"	"	"
182	K <sub>13</sub> +H <sub>1.9.0</sub> +E <sub>1.2</sub> (0 psi)/Standard 10" frisbee	"	"	"	"	"	"	"
183	K <sub>13</sub> +H <sub>1.9.1</sub> +E <sub>1.2</sub> (0 psi)/16" fabricated frisbee	"	"	"	"	"	"	"
184	K <sub>13</sub> +H <sub>1.0</sub> +E <sub>3.5.2</sub> (40 psi)/Wide chord with lip at 40 psi	"	"	"	"	"	"	"
185	K <sub>13</sub> +H <sub>1.0</sub> +E <sub>3.5.2</sub> (150 psi)/Same as 184 with 150 psi air	"	"	"	"	"	"	"
186	K <sub>13</sub> +H <sub>1.0</sub> +W <sub>4.0</sub> /Boom mounted stub wing	"	"	"	"	"	"	"
187	K <sub>13</sub> +H <sub>1.0</sub> +E <sub>3.5.4</sub> (150 psi)/Like 185 with modified shroud	"	"	"	"	"	"	"
188	K <sub>13</sub> +H <sub>1.0</sub> +I <sub>1</sub> +E <sub>1.0</sub> (0 psi)/Baseline with I <sub>1</sub> instr. ring	"	"	"	"	"	"	"
189	K <sub>13</sub> +H <sub>1.8.1</sub> +I <sub>1</sub> +E <sub>1.0</sub> (0 psi)/Solid cap, 10" diam. 3.25" height	"	"	"	"	"	"	"
190	K <sub>13</sub> +H <sub>1.8.2</sub> +I <sub>1</sub> +E <sub>1.0</sub> (0 psi)/Same as 190 except + 4.12" height	"	"	"	"	"	"	"



TABLE 2 (CONTINUED)  
LIST OF TEST RUNS  
EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					$\alpha^\circ$	$\psi^\circ$		
191	K13+H1.0.2+I1+E1.0 (0 psi)/10" cap, no underbody, 1.87" gap	80	1433/0	8	6	-3.8	$\infty$	Off
193	K13+H1.0.2+I1+E1.0 (0 psi)/10" cap, no underbody, 1.25" gap	"	"	"	"	"	"	"
194	K13+H1.11.1+I2+E1.0 (0 psi)/7.6" cap, underbody, 1.25" gap	"	"	"	"	"	"	"
195	K13+H1.11.1+I2+E1.0 (20 psi)/Same as 194 with 20 psi air	"	"	"	"	"	"	"
196	K13+H1.11.1+I2+E1.0 (40 psi)/Same as 194 with 40 psi air	"	"	"	"	"	"	"
197	K13+H1.11.1+I2+E1.0 (150 psi)/Same as 194 with 150 psi air	"	"	"	"	"	"	"
198	K13+H1.11.1+I2+E4.0 (0 psi)/Same as 194 except blowing tube 2" aft	"	"	"	"	"	"	"
199	K13+H1.11.1+I2+E4.0 (40 psi)/Same as 198 with 40 psi air	"	"	"	"	"	"	"
200	K13+H1.11.1+I2+E4.0 (150 psi)/Same as 198 with 150 psi air	"	"	"	"	"	"	"
201	K13+H1.11.2+I2+E4.0 (150 psi)/Same as 200 except center support cap	"	"	"	"	"	"	"
202	K13+H1.11.2+I2/Baseline with I2 and no blowing tube	"	"	"	"	"	"	"
203	K13+H1.0+E5.0 (0 psi)/Bifurcated air duct baseline	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

**LIST OF TEST RUNS**  
EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	VTUN KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT. h/d	TAIL ROTOR
					$\alpha^\circ$	$\psi^\circ$		
204	K13+H1.0+E5.0 (150 psi)/Bifurcated duct with 150 psi air	80	1433/0	8	6	-3.8	$\infty$	Off
205	K13+H1.0+E5.0 (40 psi)/Same as 204 with 40 psi air	"	"	"	"	"	"	"
207	K13+H1.2.1+I1+E1.0 (0 psi)/7.6" solid cap, no gap	"	"	"	"	"	"	"
208	K13+H1.2.2+I1+E1.0 (0 psi)/Same as 207 except 0.55" gap	"	"	"	"	"	"	"
210	K13+H1.15.1+I1+E1.0 (0 psi)/Repeat of 189	"	"	"	"	"	"	"
211	K13+H1.14.1+I1+E1.0 (0 psi)/Like 189 and 210 except cap is open	"	"	"	"	"	"	"

TABLE 3					
INDEX TO RAKE POSITIONS					
RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
111	20	53.5	103.1	-7.25	1
	21	"	"	"	
	22	"	105.0	"	
	24	"	107.0	"	
	26	"	109.0	"	
	28	"	111.0	"	
	30	"	112.9	"	
	32	"	114.9	"	
	34	"	116.9	"	
	36	"	118.9	"	
112	2	48.9	107.3	-7.25	1
	4	50.8	"	"	
	6	52.7	103.3	"	
	8	54.5	"	"	
	10	56.2	"	"	
	12	57.2	"	"	
113	2	51.7	103.3	-3.25	1
	4	52.3	"	"	
	6	52.8	"	"	
	8	53.3	"	"	
	10	53.9	"	"	
	11	53.3	"	"	
114	2	44.5	103.0	-3.25	1
	4	46.4	"	"	
	6	48.2	"	"	
	8	50.0	"	"	
	10	51.9	"	"	
115	3	52.9	124.7	-3.25	1
	4	52.0	"	"	
	6	50.0	"	"	
	9	48.0	"	"	
	10	46.0	"	"	
	12	44.1	"	"	
	14	42.1	"	"	
	16	53.0	"	"	
	18	54.0	"	"	
	20	55.0	"	"	

TABLE 3 (CONTINUED)  
INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
116	7	36.9	100.5	-17.5	1
117	2 4 6 8 10	37.6 " 37.3 " "	100.5 " 99.6 " "	-16.0 -14.0 -12.0 -10.0 - 8.0	1
118	2	37.6	100.5	- 6.0	1
119	2 5 8 9 14 16 20 25	37.3 " " " " " 51.5 52.3	99.6 " " " " " 102.5 101.7	+ 6.0 8 10 " 14 16 17.5 -17.5	1
121	3 4 6 8 10	62.9 53.5 50.1 46.0 42.1	129.0 " " " "	+ 5.7 " " " "	2
135	2 4 6 8 10 12 14	56.9 54.5 52.5 50.5 48.5 46.5 44.5	106.3 " " " " " "	- 5.7 " " " " " "	3
136	2 4 6 8 10 12 14 17 18 19	56.5 54.5 52.5 50.6 48.5 46.5 44.5 37.1 39.0 41.0	104.0 " " " " " " " " "	- 8.0 " " " " " " " " "	4



TABLE 3 (CONTINUED)  
INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
137	3	38.7	98.4	- 8.0	5
	5	39.9	"	"	
	7	42.0	100.5	"	
	9	44.0	"	"	
	11	46.0	103.6	"	
	13	48.0	"	"	
	15	50.0	"	"	
	17	52.0	"	"	
	19	54.0	"	"	
138-41, 143	2	38.8	98.4	- 8.0	5
	3	40.0	"	"	
	4	42.0	100.5	"	
	5	44.0	"	"	
	6	46.0	103.6	"	
	7	48.0	"	"	
	8	50.0	"	"	
	9	52.0	"	"	
	10	54.0	"	"	
142	7	37.8	98.4	- 8.0	5
	8	"	"	"	
	9	40.2	"	"	
	10	42.0	100.5	"	
	11	44.0	"	"	
	12	46.0	103.6	"	
	13	48.0	"	"	
	14	50.0	"	"	
	15	52.0	"	"	
	16	54.0	"	"	
	17	56.8	"	"	



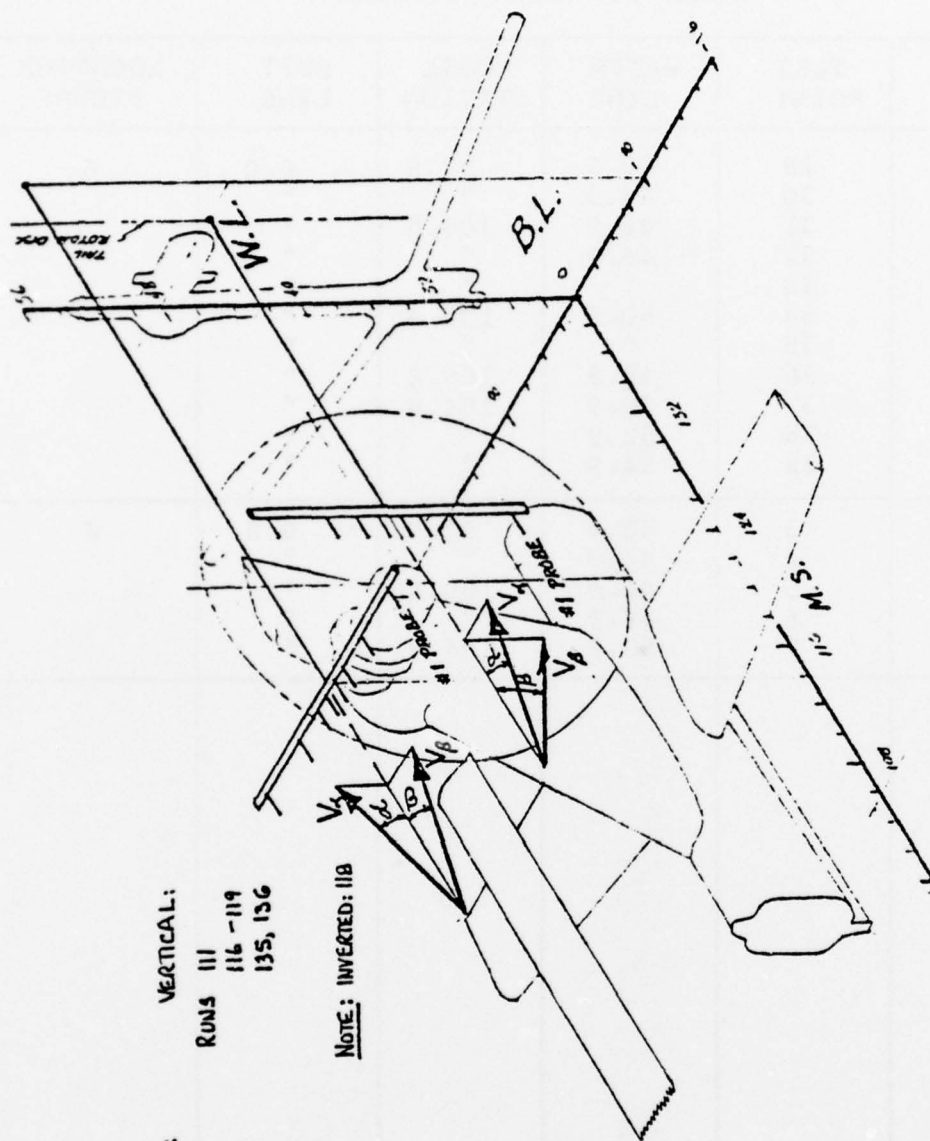
TABLE 3 (CONTINUED)  
INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
149-151	2	38.8	98.5	- 8.0	5
	3	40.0	"	"	
	4	42.0	100.6	"	
	5	44.0	"	"	
	6	46.0	103.5	"	
	7	48.0	"	"	
	8	50.0	"	"	
	9	52.0	"	"	
	10	54.0	"	"	
152-6, 158	2	42.9	97.9	0.0	6
161-4, 166	3	44.9	"	"	
167, 169-71	4	46.9	100.6	"	
175, 177-9	5	48.9	"	"	
180, 182, 184	6	50.9	104.6	"	
186-8, 190	7	52.9	"	"	
191, 193, 194	8	54.9	"	"	
196, 198, 201	9	56.9	"	"	
204, 207, 208					
211					
159	1	54.9	104.6	0.0	6
	2	52.9	"	"	
	3	50.7	"	"	
	4	48.6	100.6	"	
	5	46.7	"	"	
160, 203	5	42.9	97.9	0.0	6
	6	44.9	"	"	
	7	46.9	100.6	"	
	8	48.9	"	"	
	9	50.9	104.6	"	
	10	52.9	"	"	
	11	54.9	"	"	
165	3	44.9	97.9	0.0	6
	4	42.9	"	"	
	5	46.9	100.6	"	
	6	48.9	"	"	
	7	50.9	104.6	"	
	8	52.9	"	"	

TABLE 3 (CONTINUED)  
INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
168, 183	4	42.9	97.9	0.0	6
	5	44.9	"	"	
	6	46.9	100.6	"	
	7	48.9	"	"	
	8	50.9	104.6	"	
	9	52.9	"	"	
	10	54.9	"	"	
172	3	42.9	97.9	0.0	6
	4	44.9	"	"	
	6	44.9	"	"	
	7	46.9	100.6	"	
	8	48.9	"	"	
	9	50.9	104.6	"	
	10	52.9	"	"	
173, 174, 176 185, 195, 197 199, 200, 205 210	1	42.9	97.9	0.0	6
	2	44.9	"	"	
	3	46.9	100.6	"	
	4	48.9	"	"	
	5	50.9	104.6	"	
	6	52.9	"	"	
	7	54.9	"	"	
181	2	42.9	97.9	0.0	6
	3	44.9	"	"	
	4	46.9	100.6	"	
	5	48.9	"	"	
	6	50.9	104.6	"	
	7	52.9	"	"	
	9	54.9	"	"	
	10	"	"	"	
	11	"	"	"	
	12	"	"	"	
	13	42.9	97.9	"	

[illegible]



VERTICAL:  
 RUNS 111  
 116-119  
 135, 136

HORIZONTAL:  
 RUNS 112-115  
 121  
 137-143  
 148-156  
 158-211

NOTE: INVERTED: 118

FIGURE 1 - RAKE ORIENTATION DIAGRAM



RUN 121

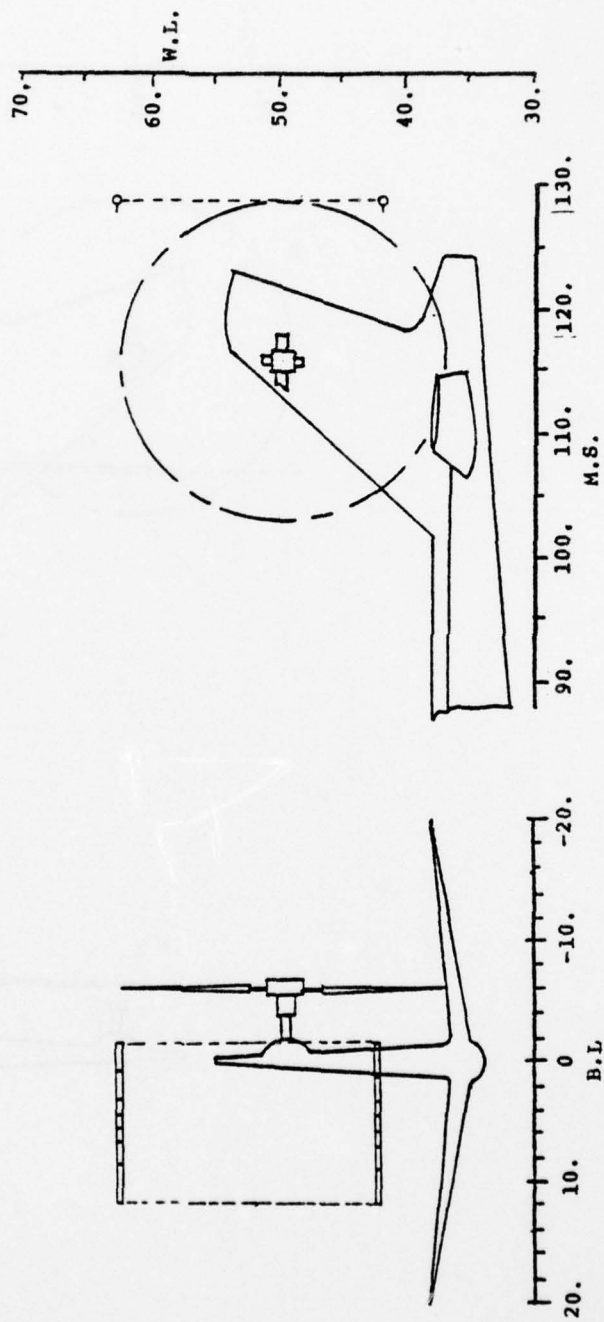


FIGURE 2 -HOT FILM RAKE LOCATIONS

RUN 135

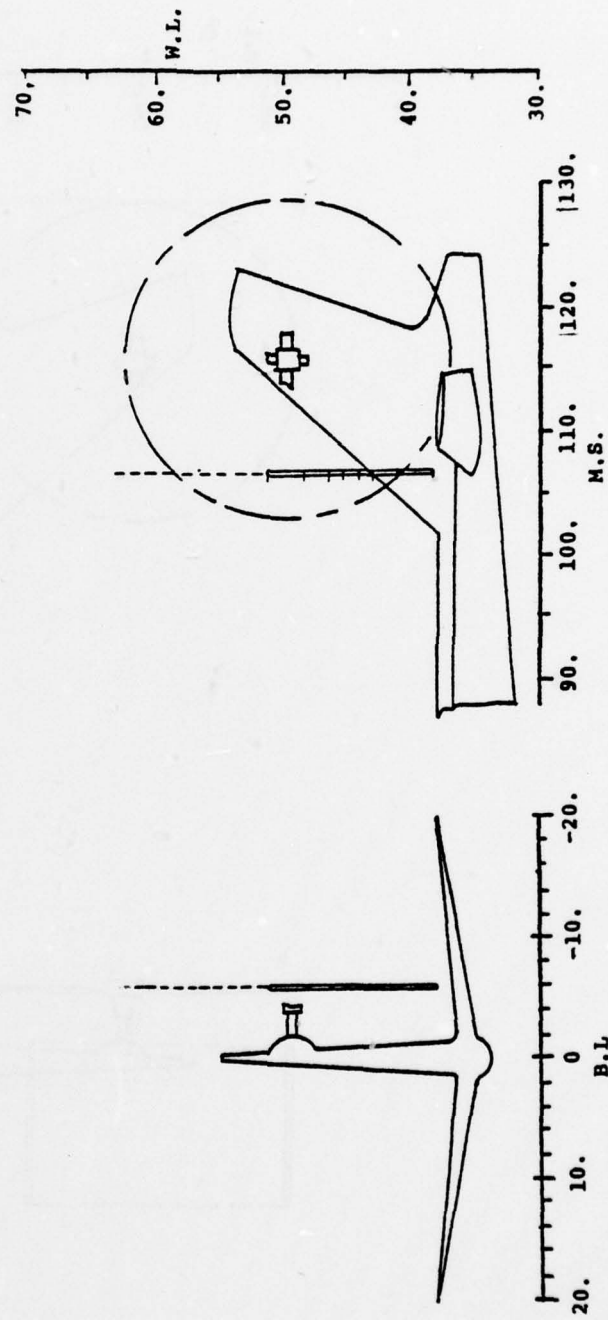


FIGURE 3 -HOT FILM RAKE LOCATIONS

RUN 136

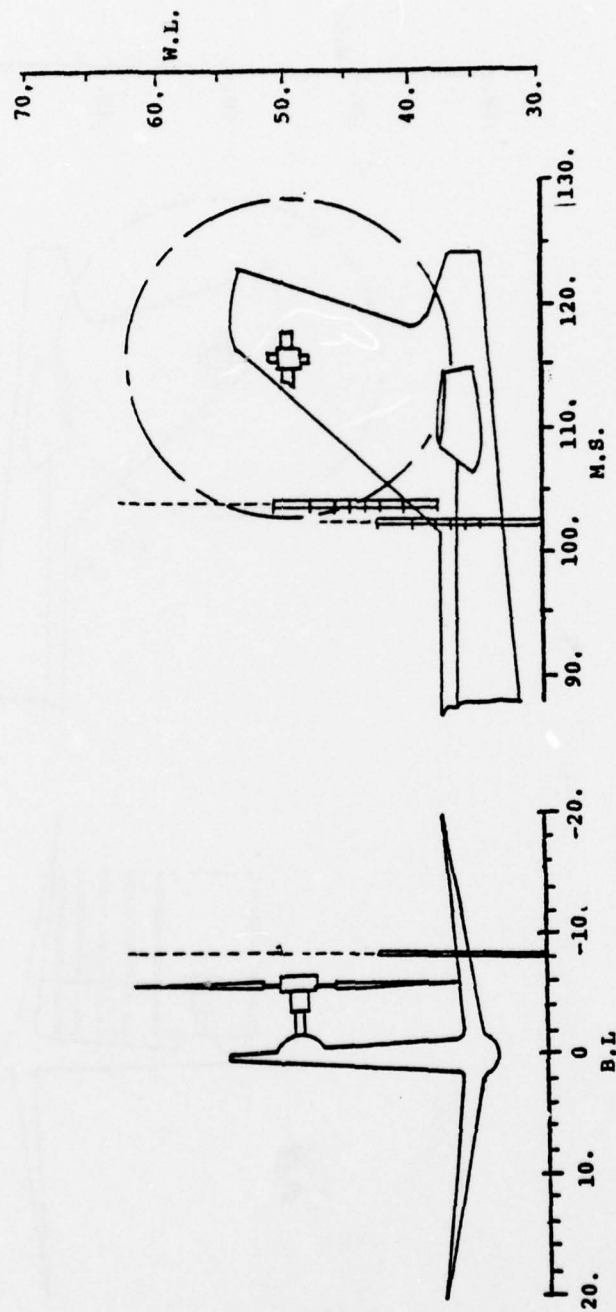


FIGURE 4 -HOT FILM RAKE LOCATIONS

RUN 137, 138, 139, 140, 141, 142,  
143, 148, 149, 150, 151

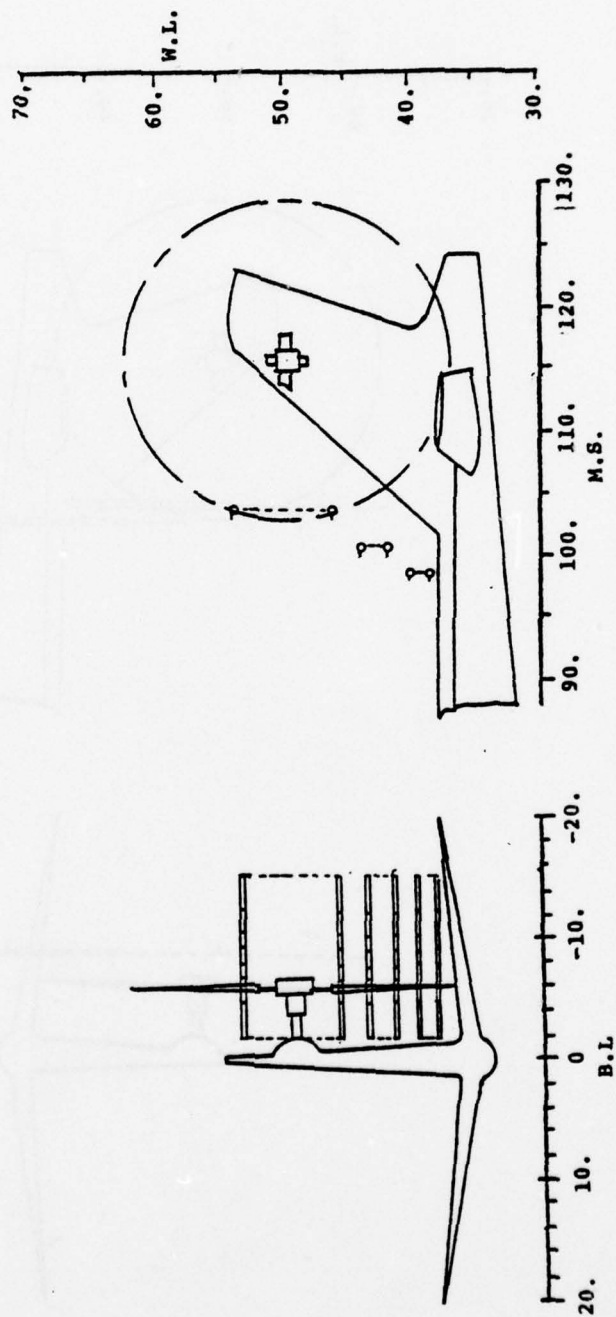


FIGURE 5 -HOT FILM RAKE LOCATIONS



RUN 152-156, 158-211

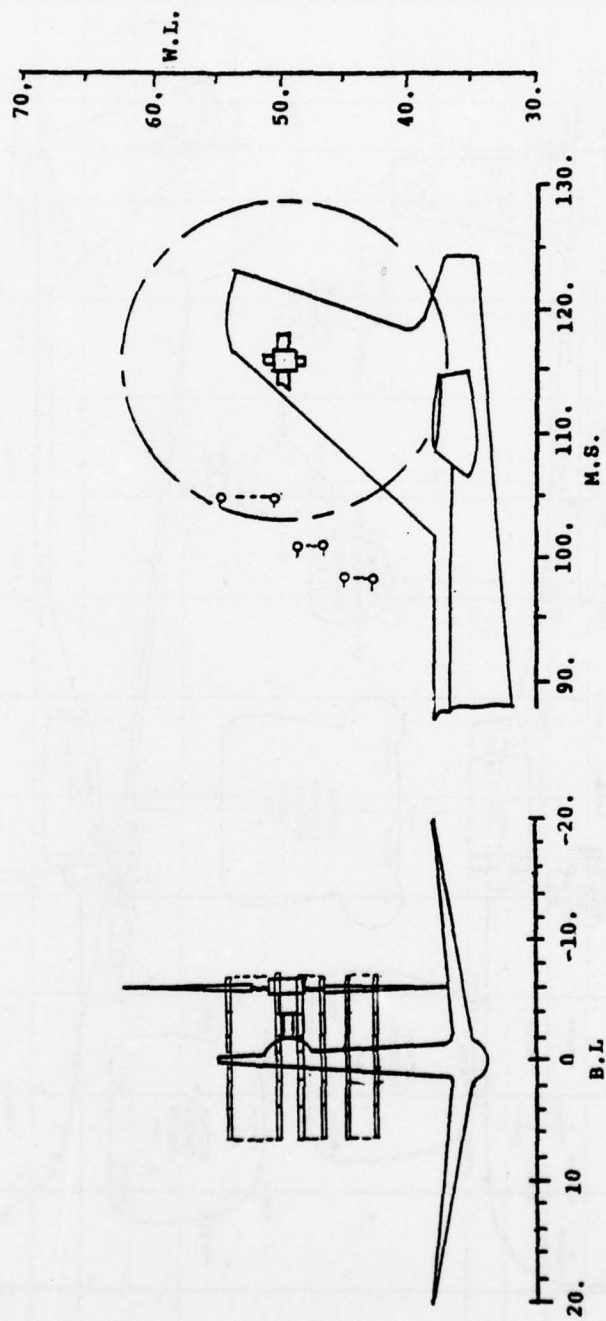


FIGURE 6 -HOT FILM RAKE LOCATIONS

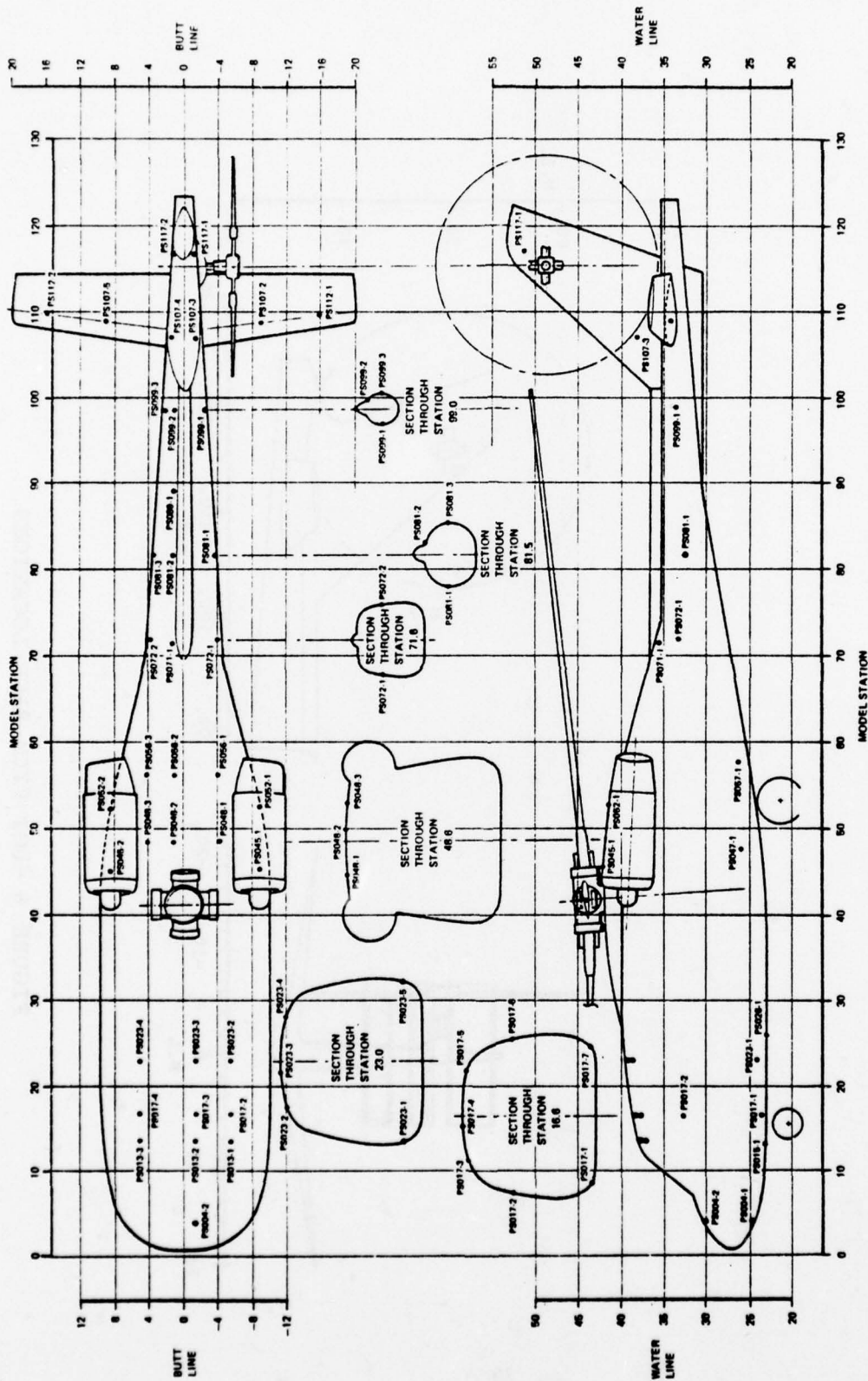


FIGURE 7 -1/4.85 SCALE MODEL GEOMETRY AND  
SURFACE PRESSURE TRANSDUCER LOCATIONS

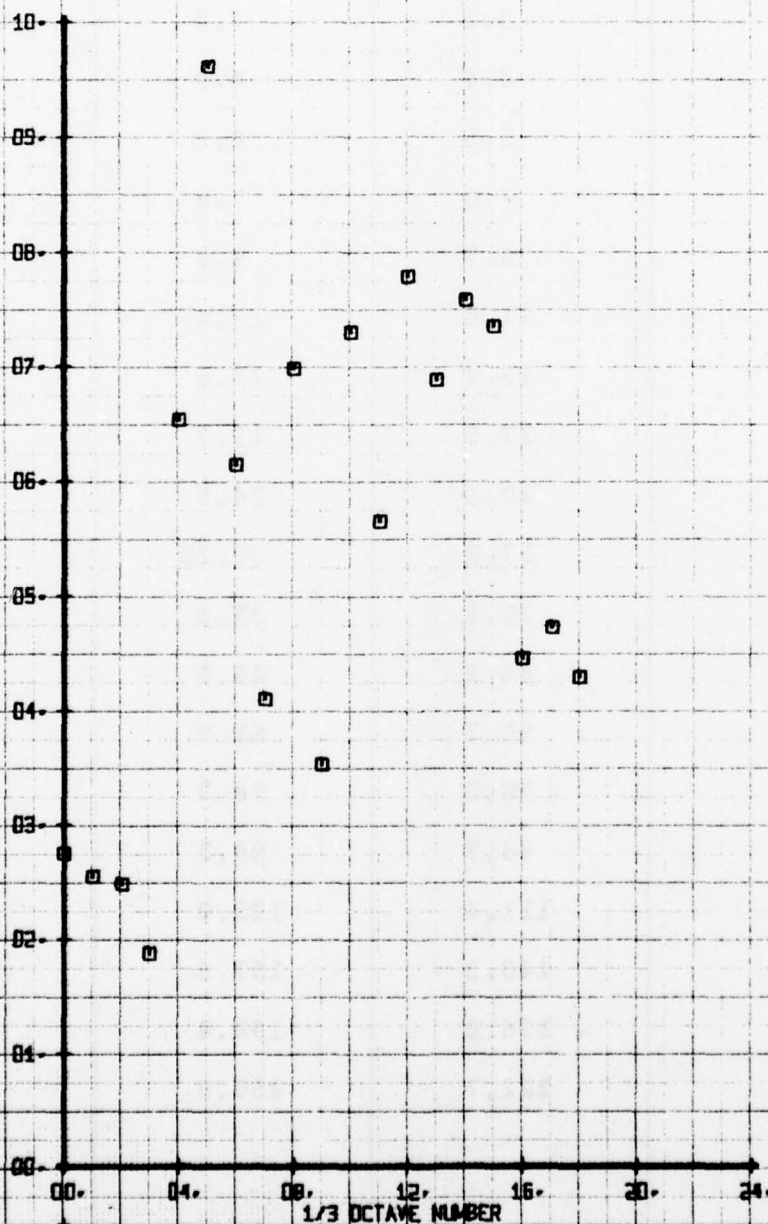
TABLE 4  
1/3 OCTAVE BAND IDENTIFICATION

BAND NUMBER	BAND WIDTH - Hz		
	MINIMUM	CENTER	MAXIMUM
0	3.5	3.4	4.4
1	4.4	4.9	5.5
2	5.5	6.2	7.0
3	7.0	7.8	8.7
4	8.7	9.8	11.0
5	11.0	12.4	13.9
6	13.4	15.6	17.5
7	17.5	19.7	22.1
8	22.1	24.8	27.8
9	27.8	31.25	35.1
10	35.1	39.4	44.2
11	44.2	49.6	55.7
12	55.7	62.5	70.2
13	70.2	78.7	88.9
14	88.9	99.2	111.4
15	111.4	125.0	140.3
16	140.3	157.5	176.8
17	176.8	198.4	222.7
18	222.7	250.0	280.6

HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 2

SYM	CH	PARAMETER
□	71	VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



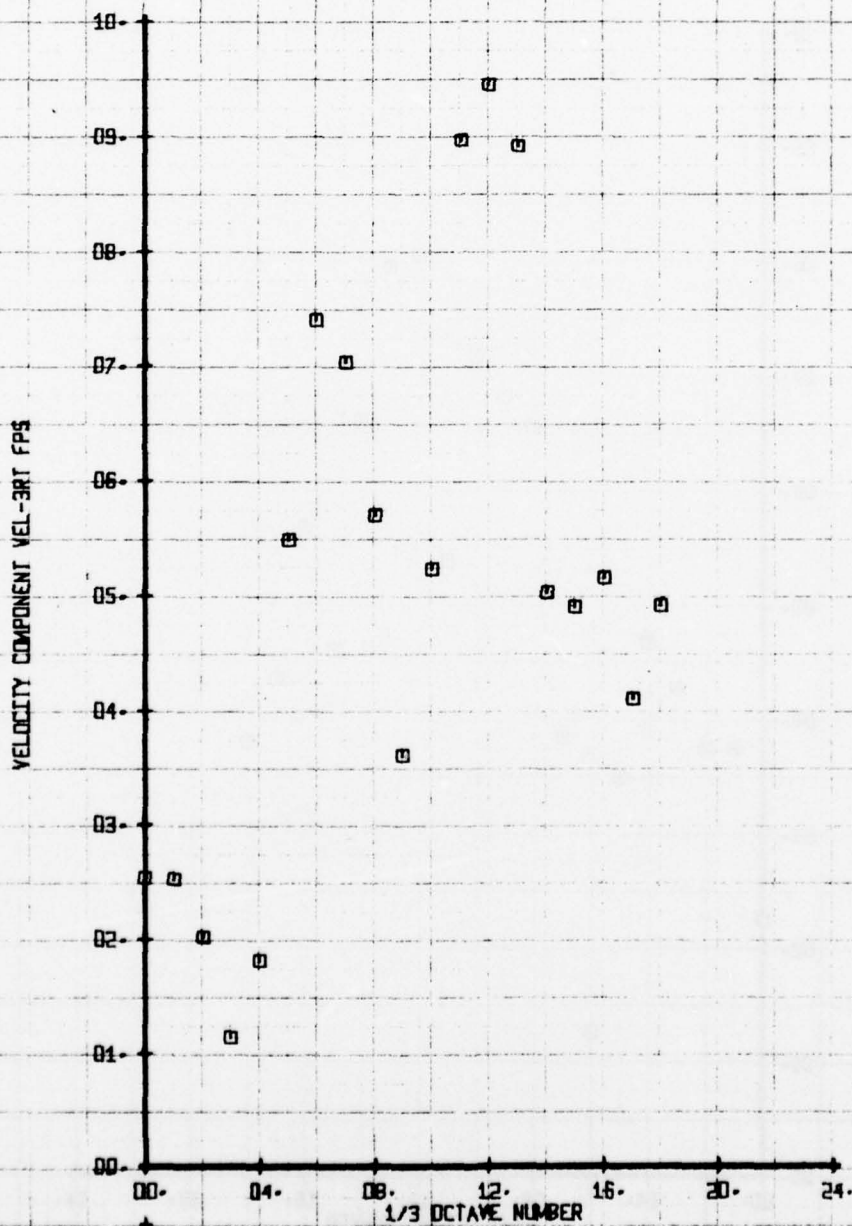


HOT FILM WAVE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELL'S DEF  
 RUN 149 TP 3

SYM  
 0

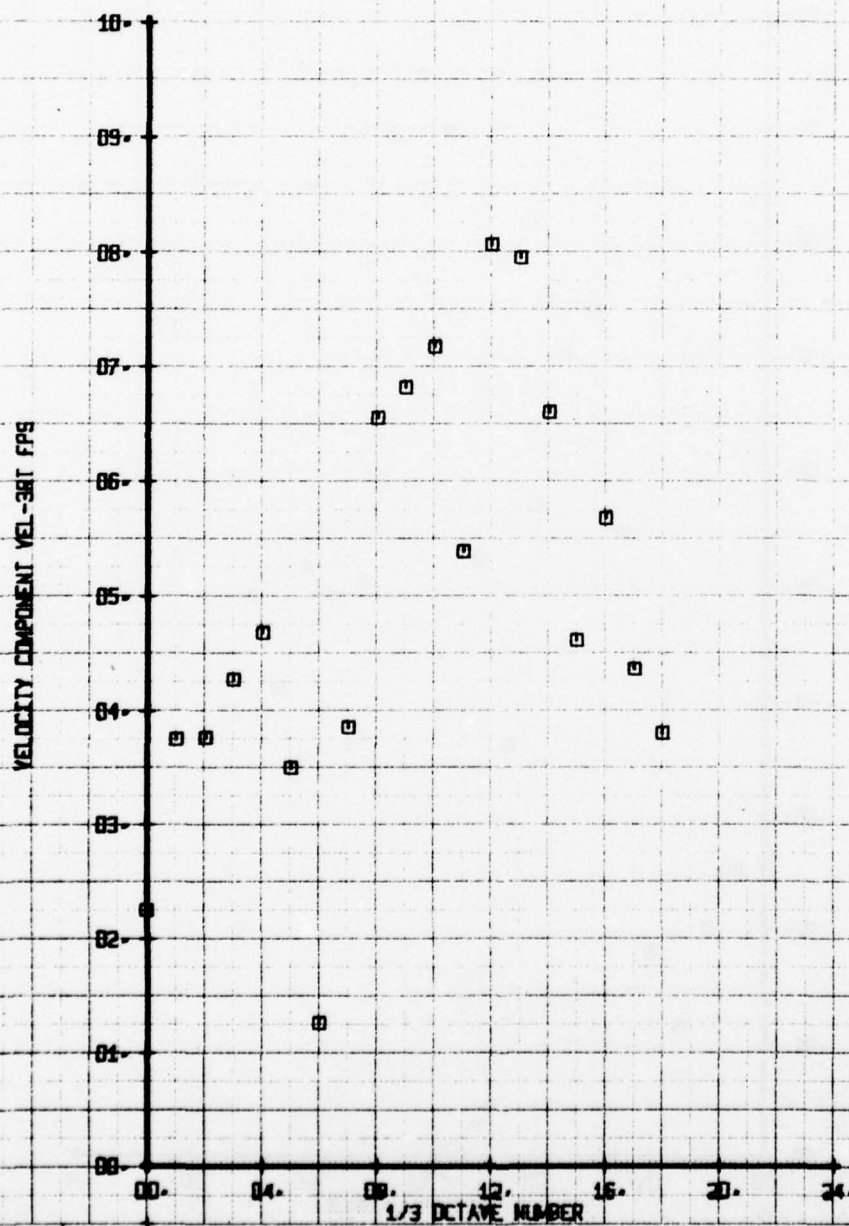
CH  
 71

LEGEND  
 PARAMETER  
 VEL-3RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 4

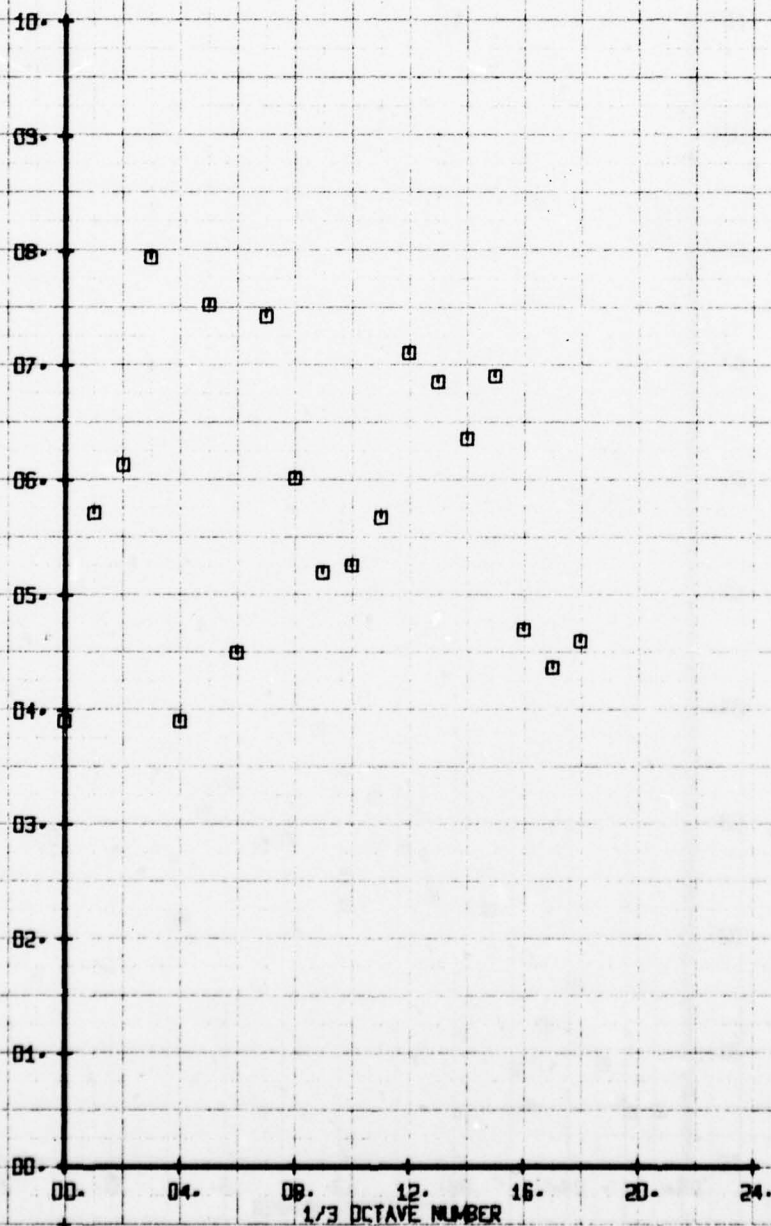
SYM	CH	PARAMETER
□	71	VEL-3RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 5

SYN CH PARAMETER  
 0 71 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 6

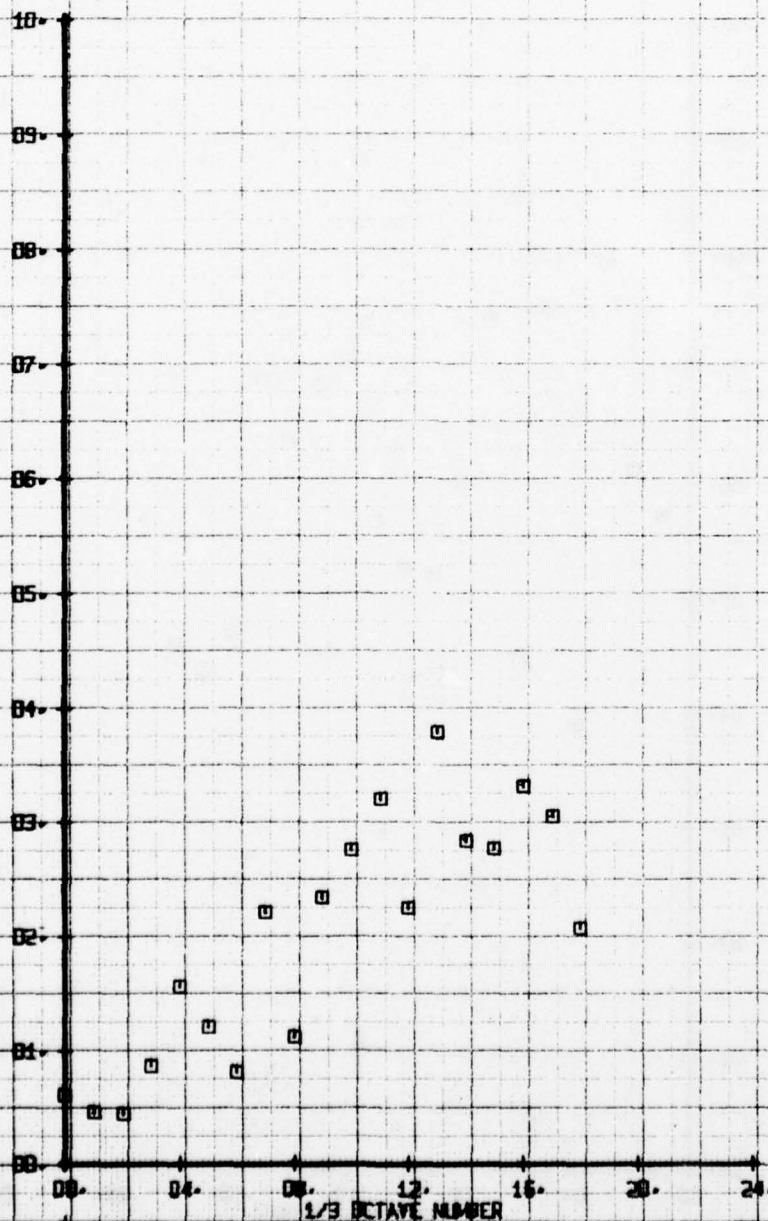
SYM  
 □

CH  
 71

LEGEND

PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS





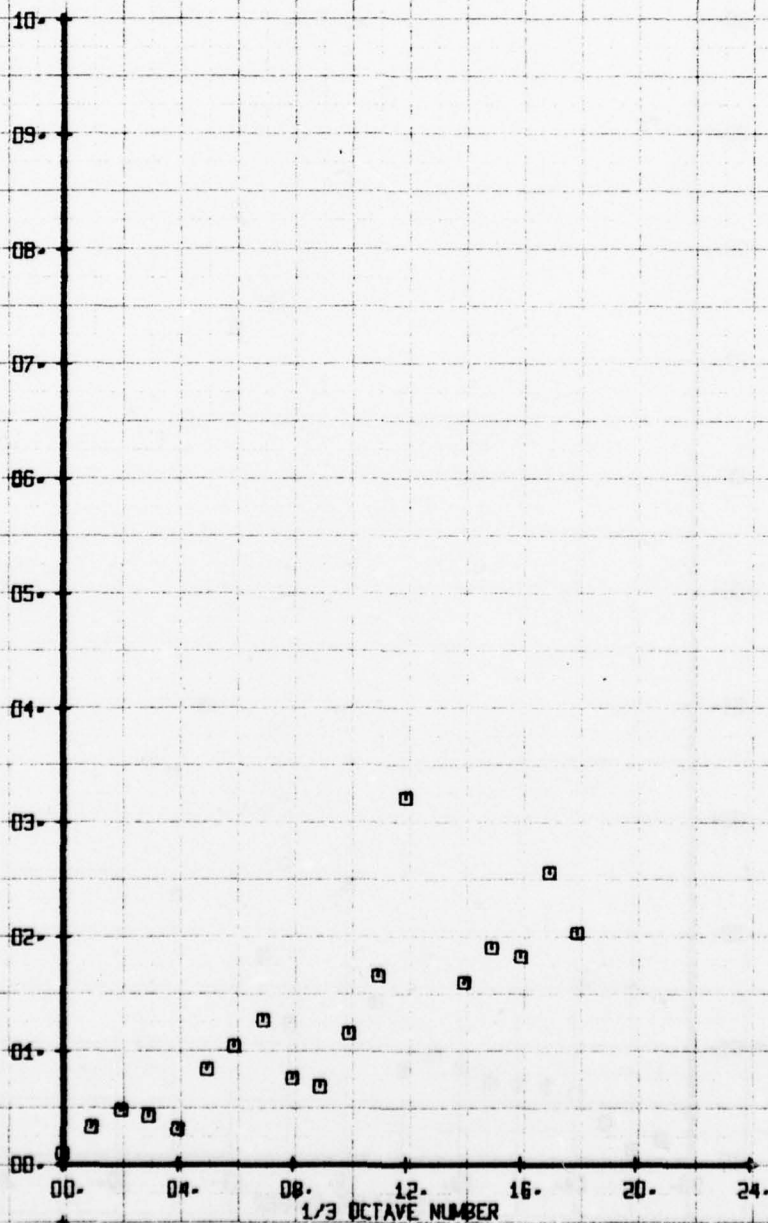
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 7

SYM  
 □

CH  
 71

LEGEND  
 PARAMETER  
 VEL-3RT

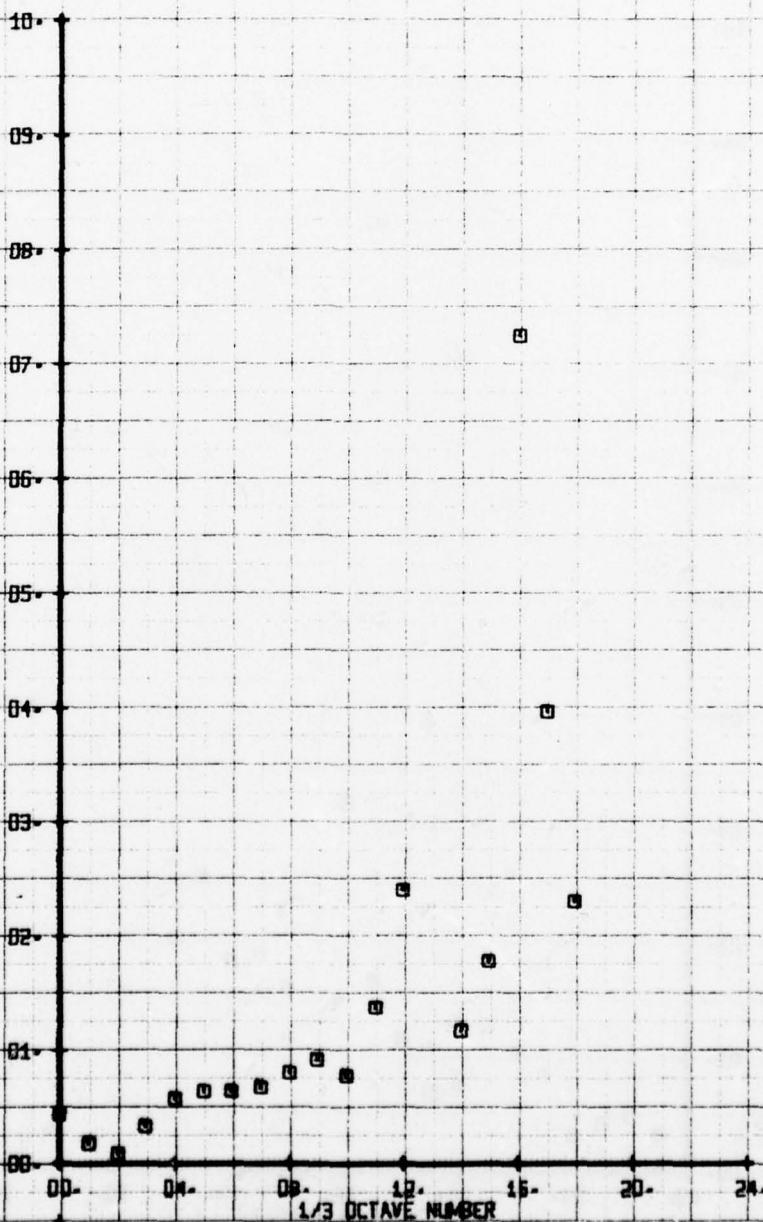
VELOCITY COMPONENT VEL-3RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 8

SYM	CH	PARAMETER
□	71	VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



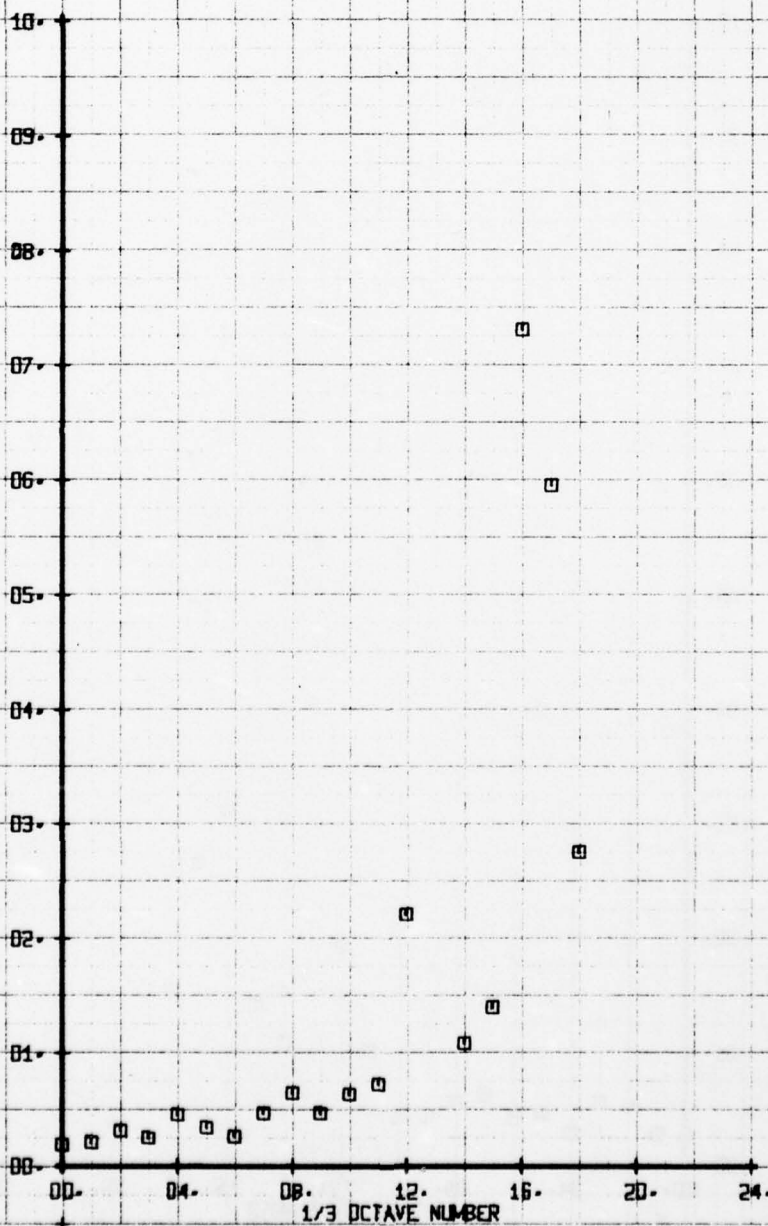
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE BUILD-UP NACELLES OFF  
RUN 149 TP 9

SYM  
□

CH  
71

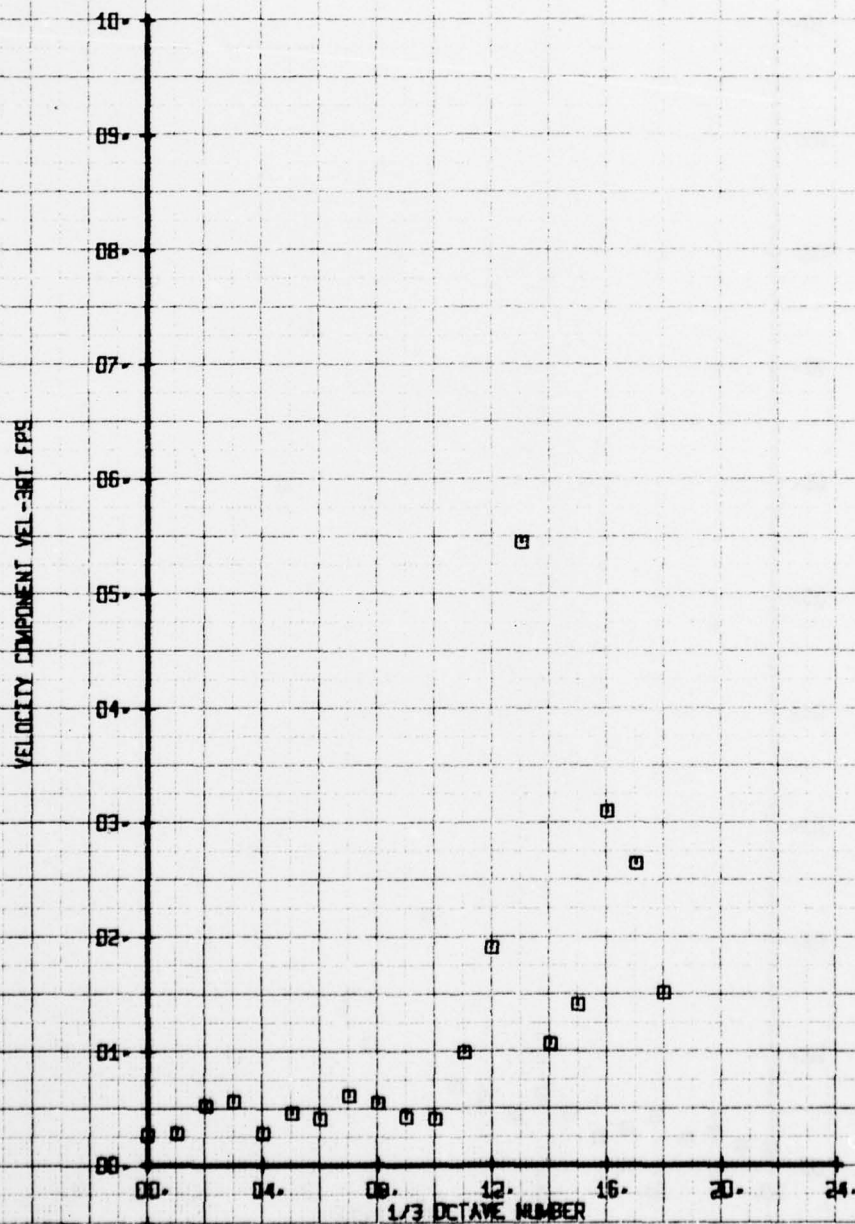
LEGEND  
PARAMETER  
VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 10

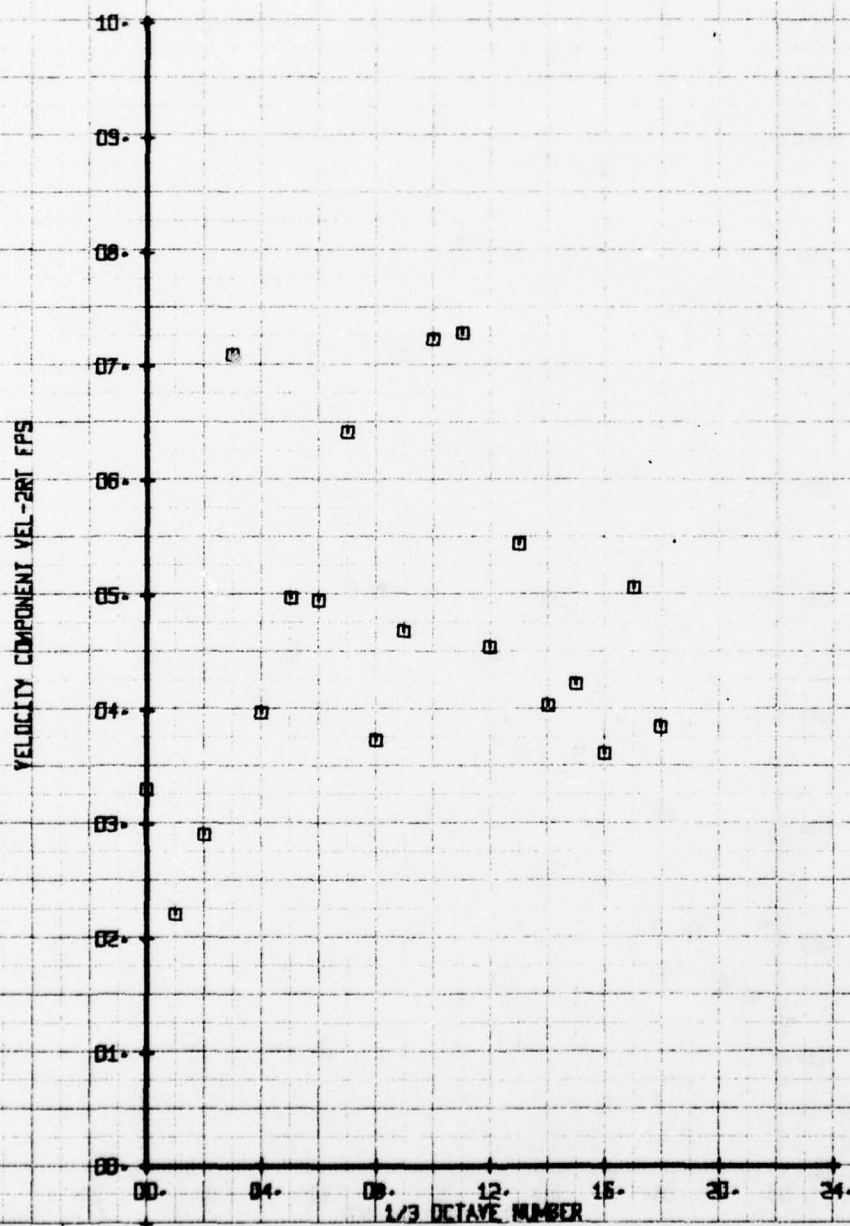
SYM CH PARAMETER  
 □ 71 VEL-3RT

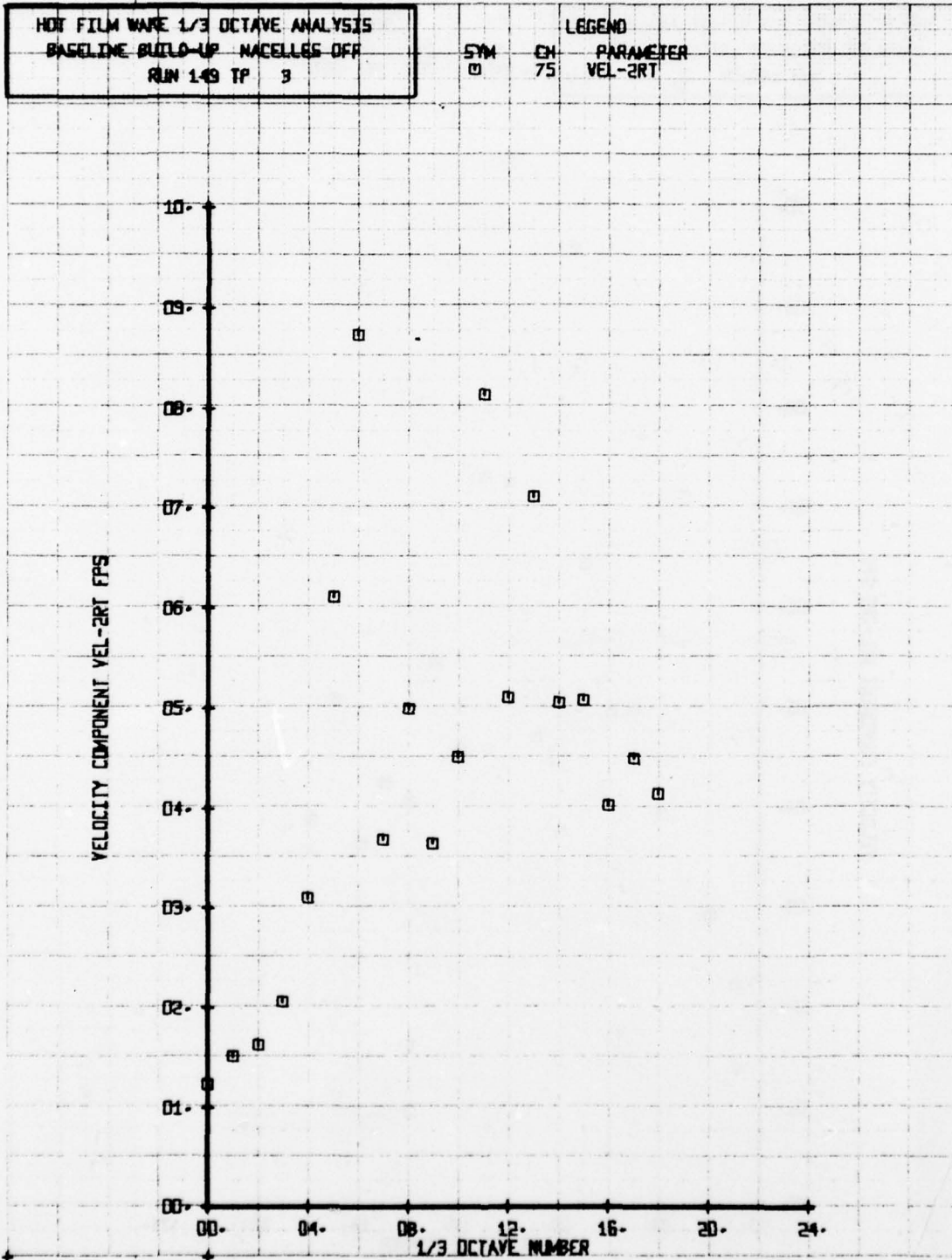


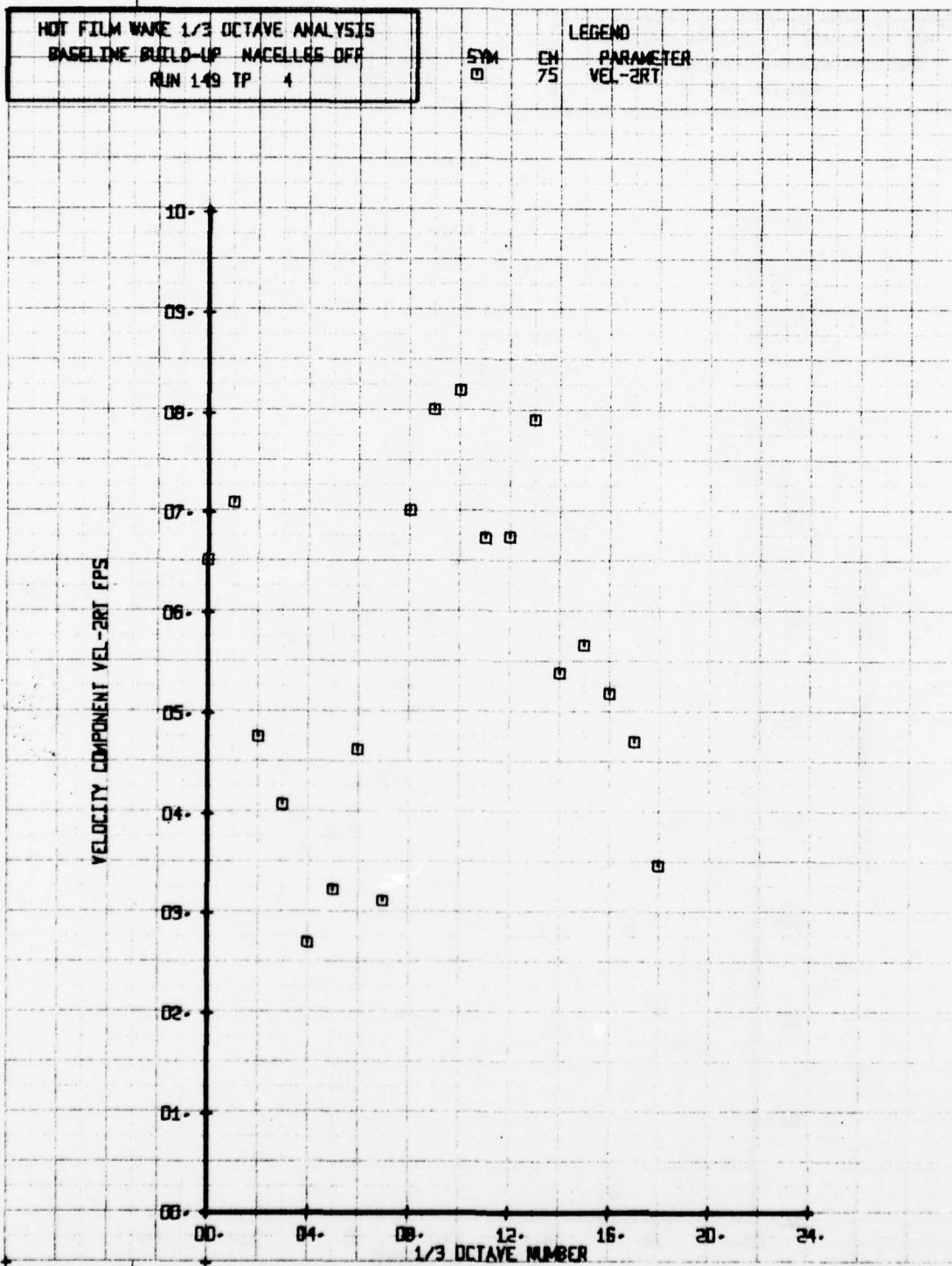


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 2

LEGEND  
 CH PARAMETER  
 75 VEL-2RT







HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 5

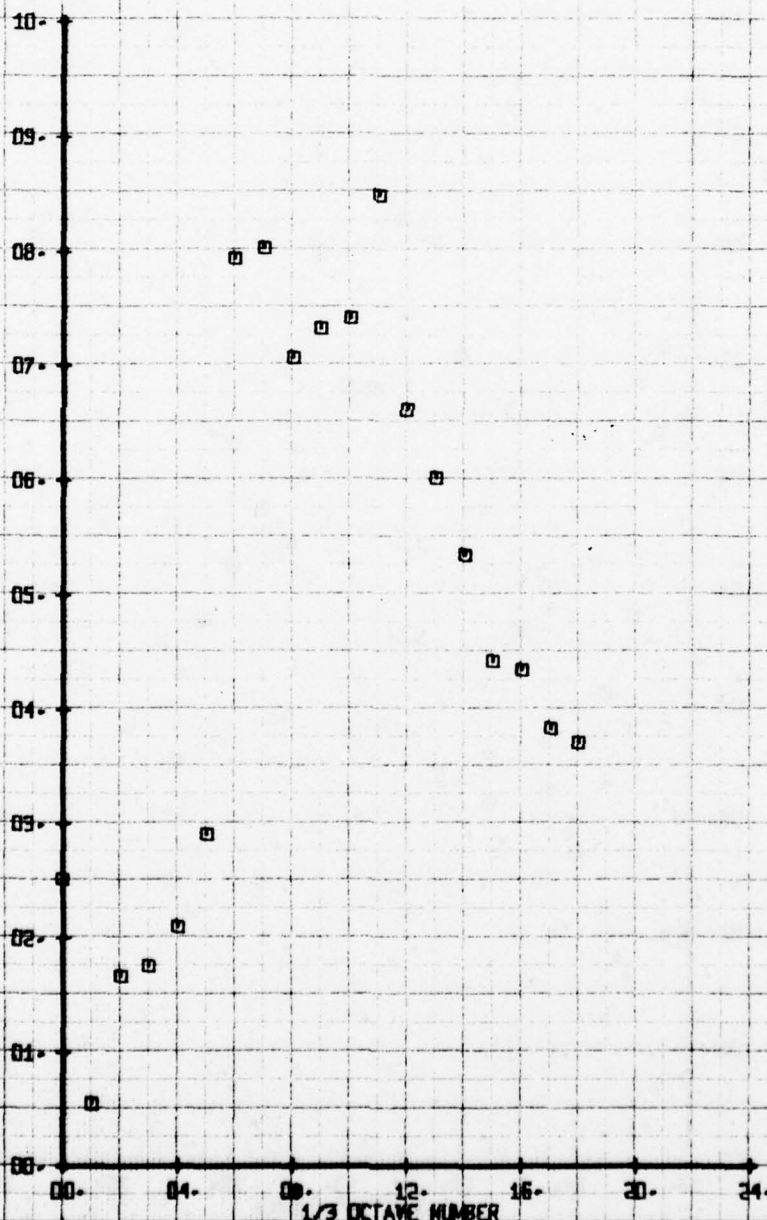
SYM  
 □

LEGEND

CH  
 75

PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 6

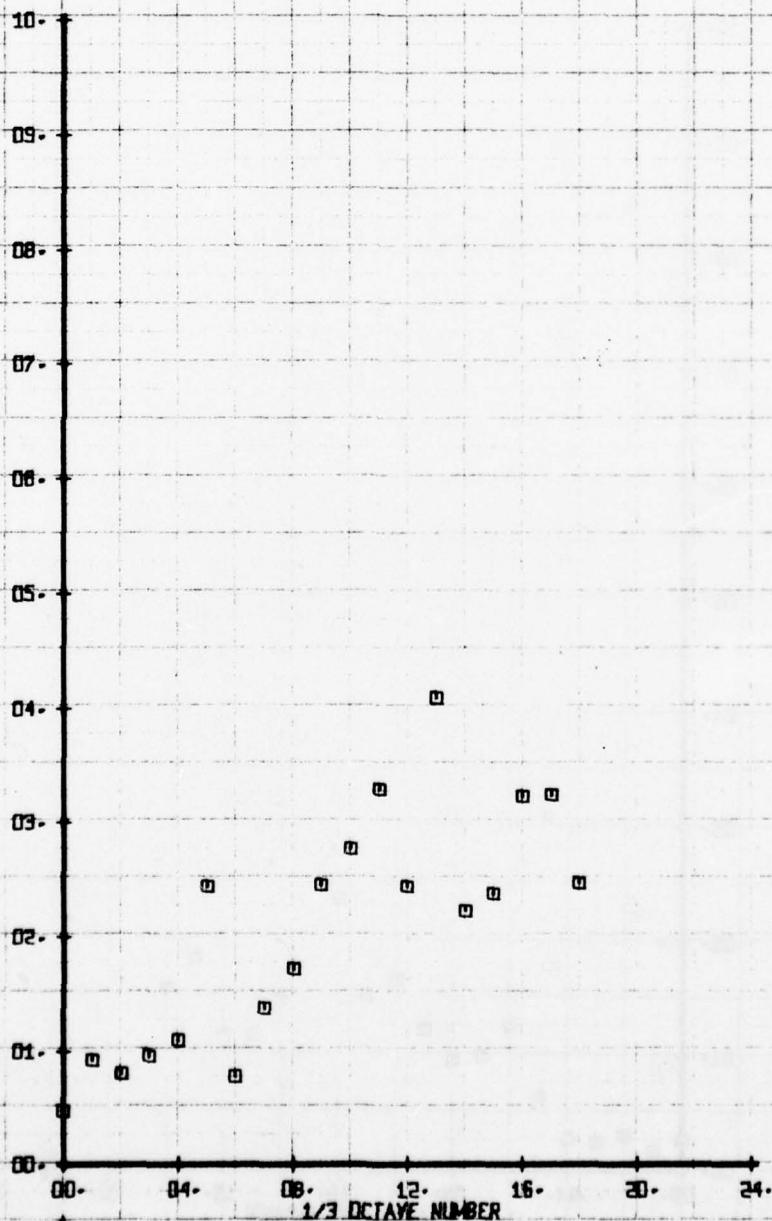
SYM  
 □

LEGEND

CH  
 75

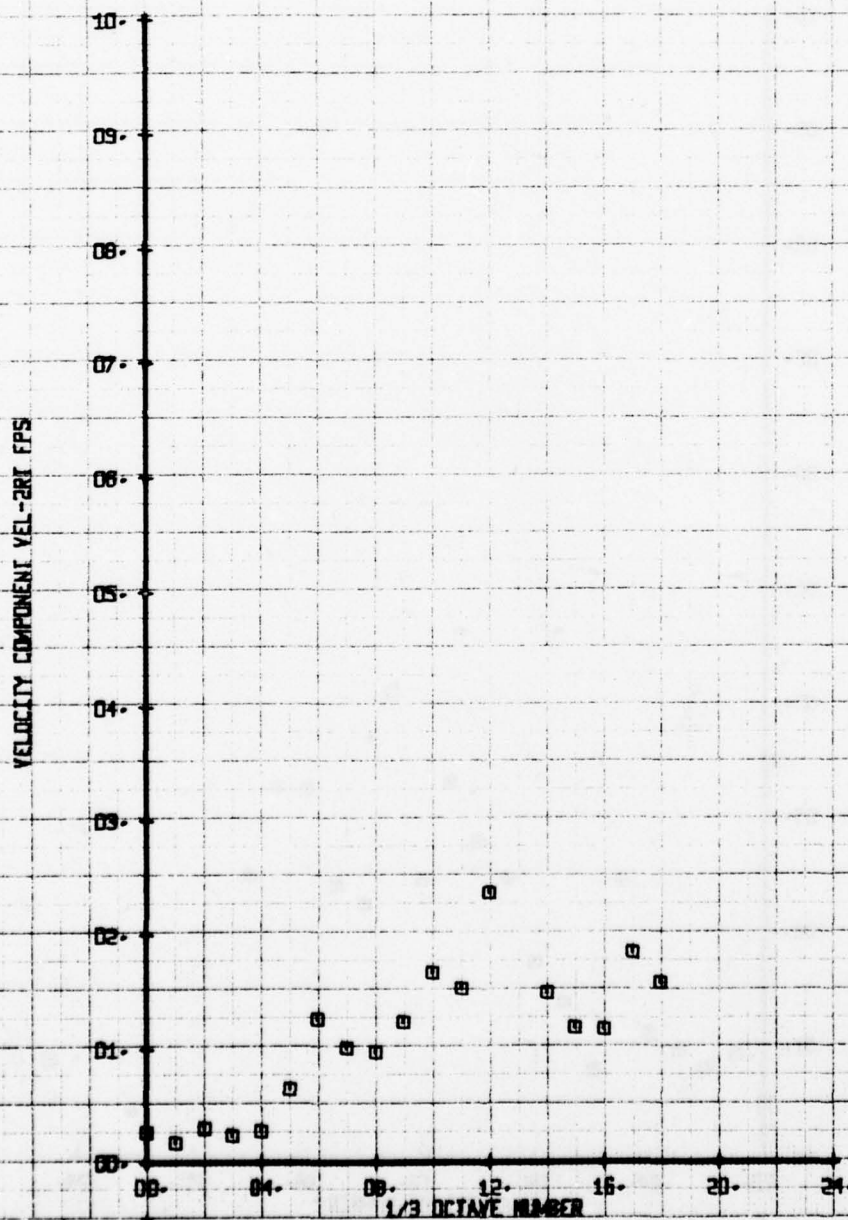
PARAMETER  
 VEL-2RT

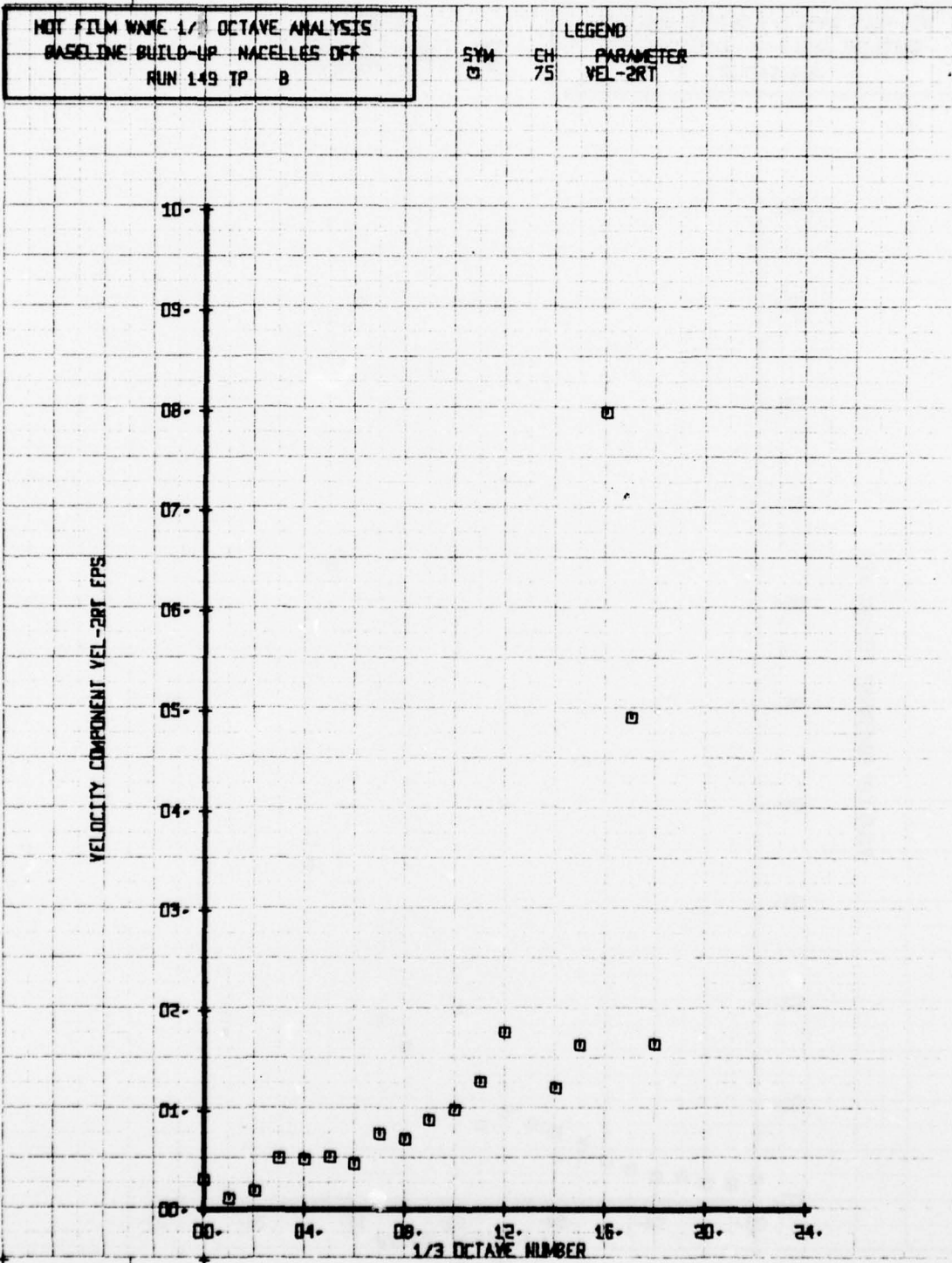
VELOCITY COMPONENT VEL-2RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 7

SYM	CH	PARAMETER
□	75	VEL-2RT





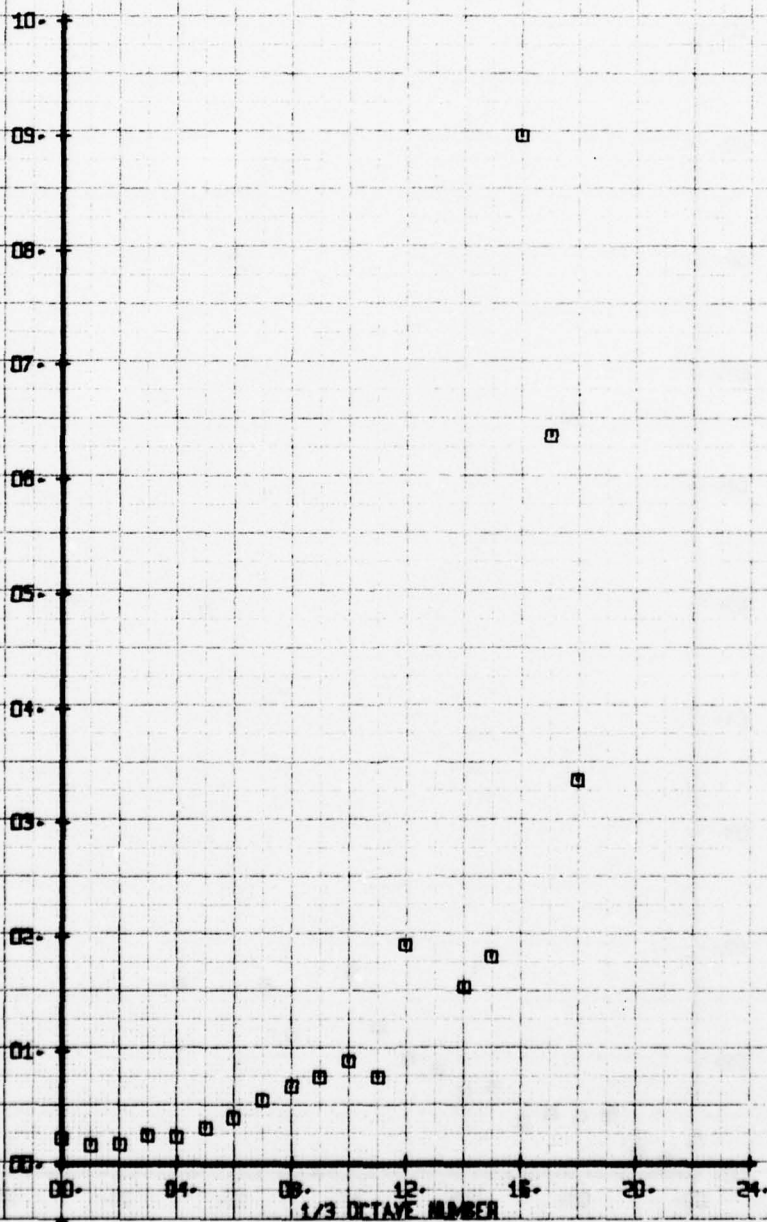
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 9

SYM  
 □

CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS



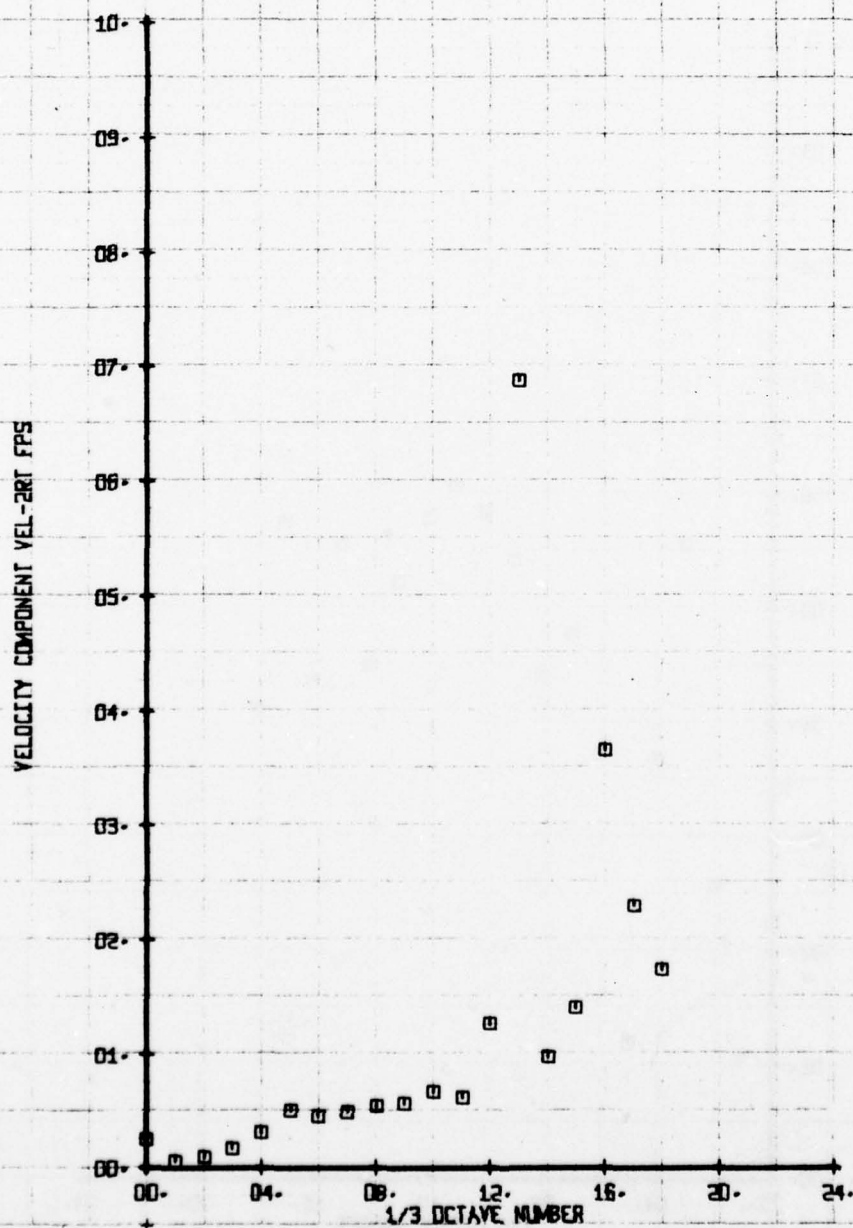


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 10

SYM  
 □

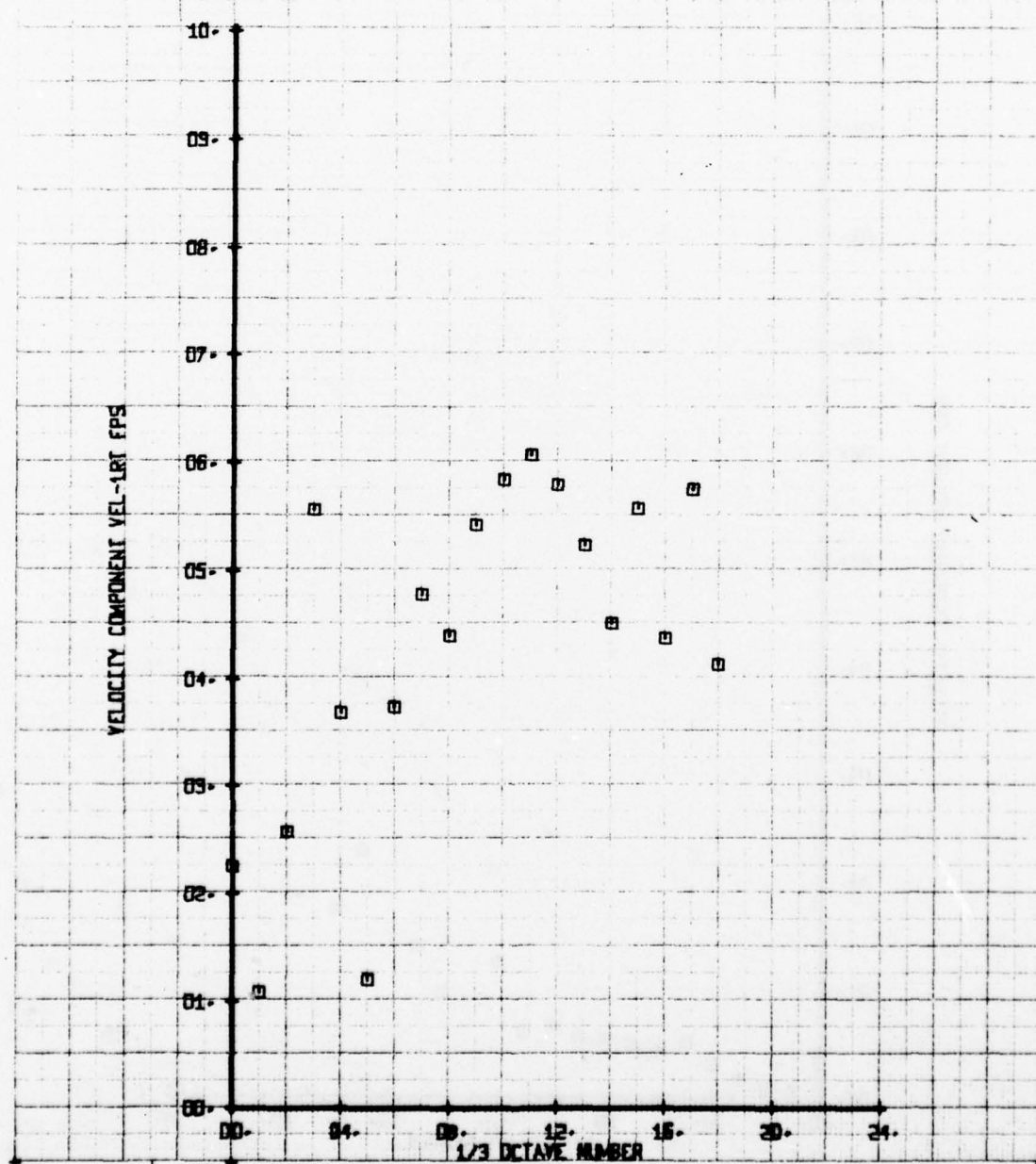
CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 2

SYN CH PARAMETER  
 □ 74 VEL-1RT

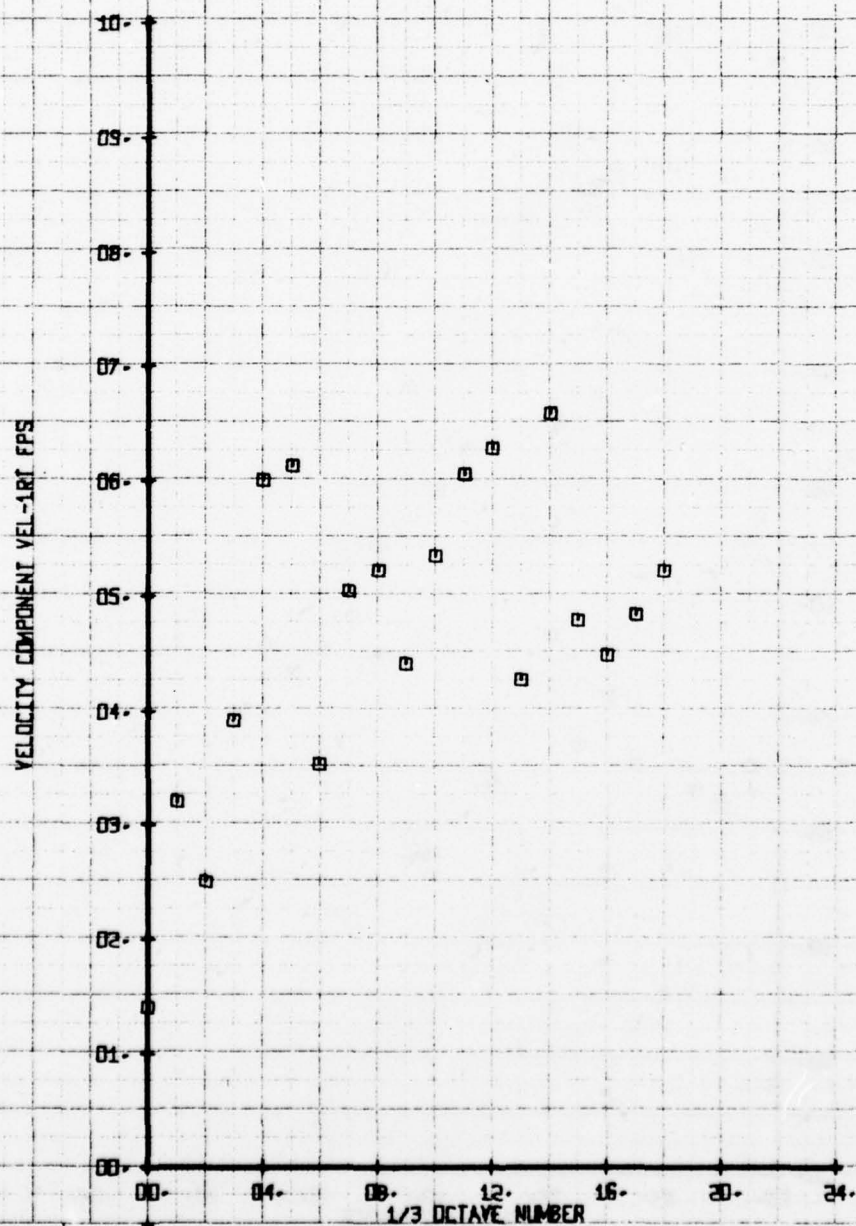


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES DFR  
 RUN 149 TP 3

SYM  
 0

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

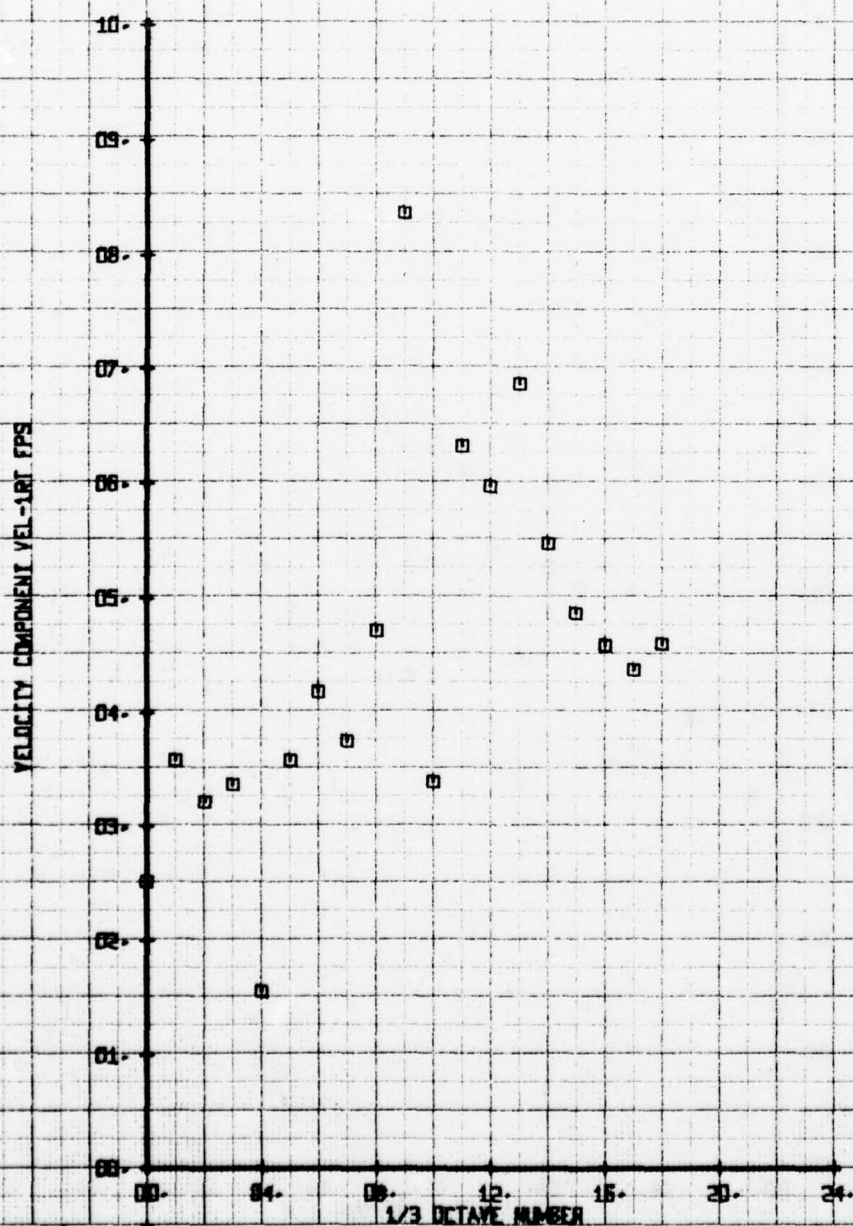


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 4

SYM  
 □

LEGEND

CH: 74  
 PARAMETER  
 VEL-1RT





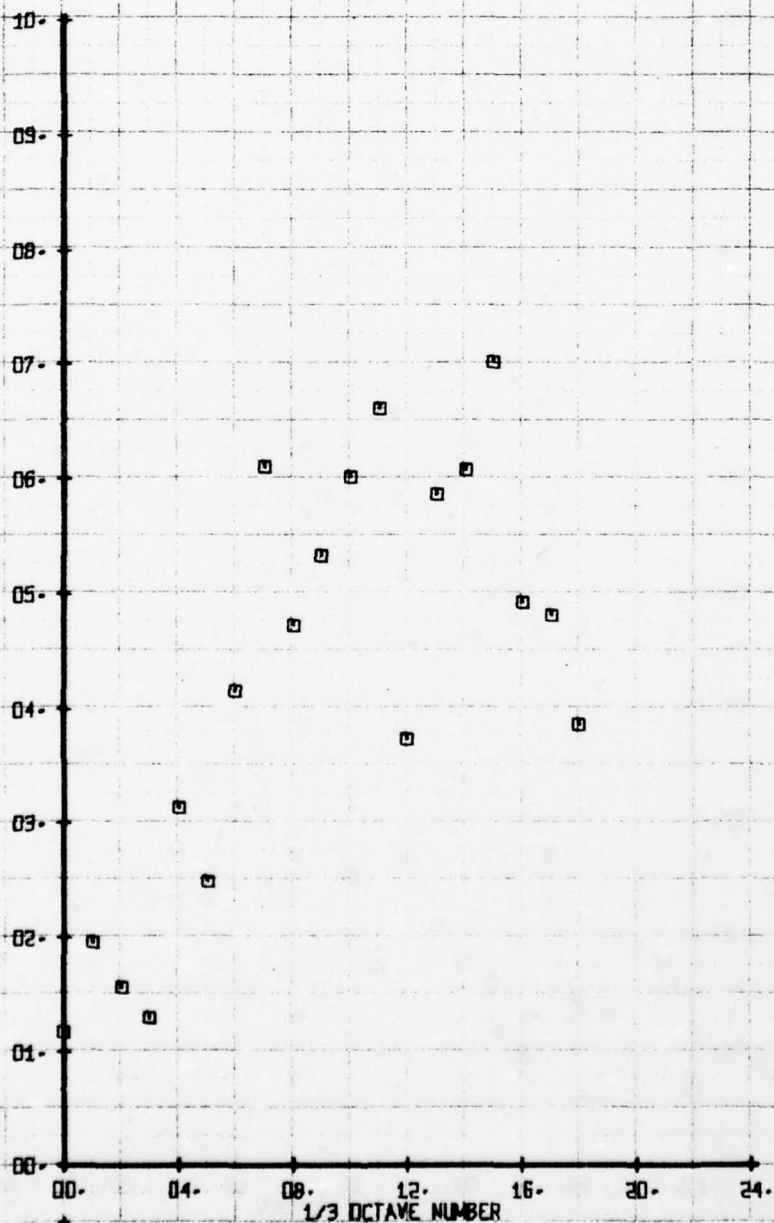
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE BUILD-UP NACELLES OFF  
RUN 149 TP 5

SYM  
□

CH  
74

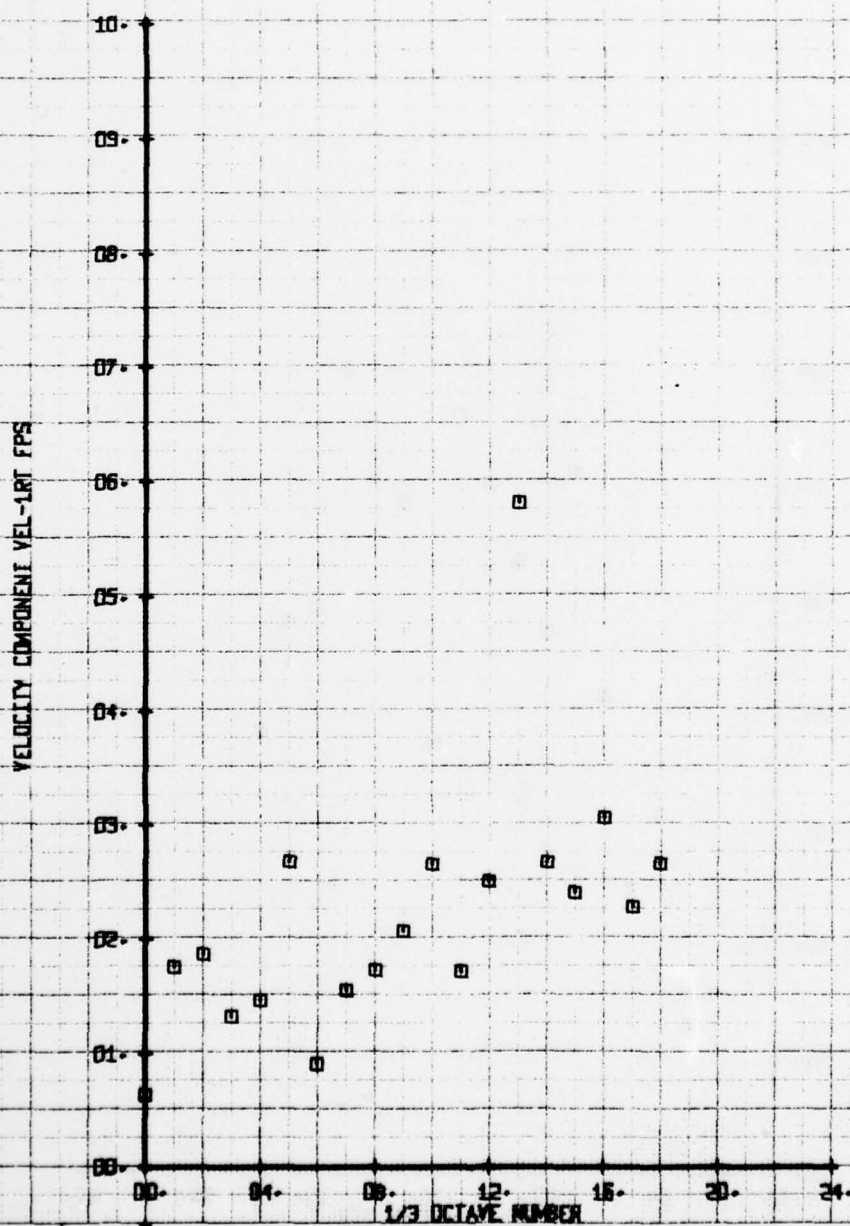
LEGEND  
PARAMETER  
VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE BUILD-UP NACELLBS OFF  
RUN 149 TP 6

LEGEND  
SYM CH PARAMETER  
□ 74 VEL-1RT



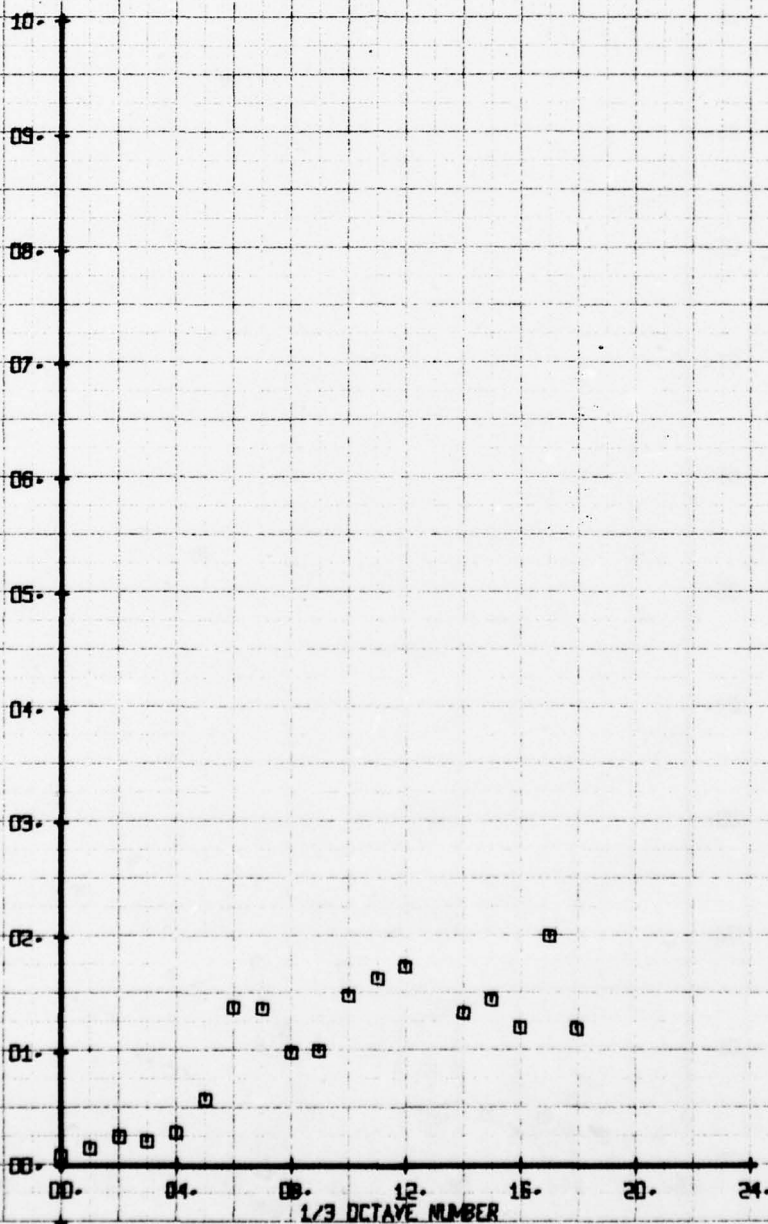
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 7

SYM  
 □

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

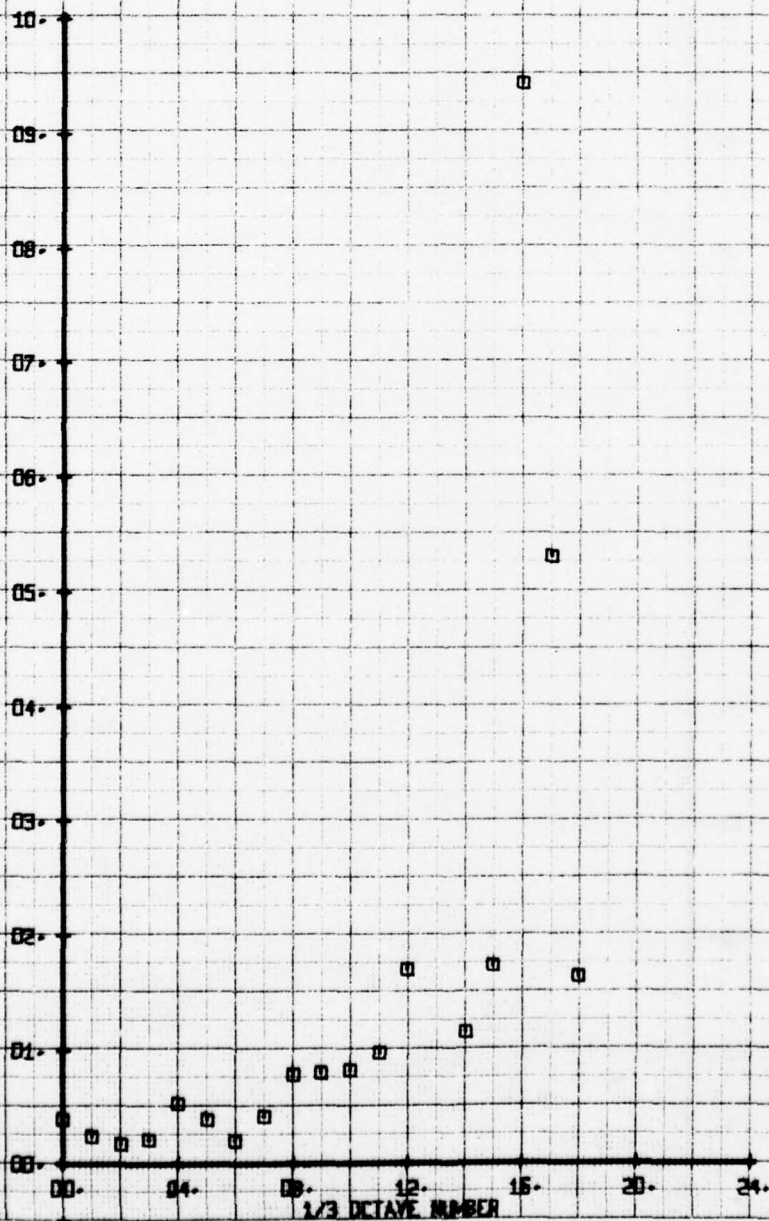
VELOCITY COMPONENT VEL-1RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP - NACELLES OFF  
 RUN 149 TP 8

SYM	CH	PARAMETER
□	74	VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS





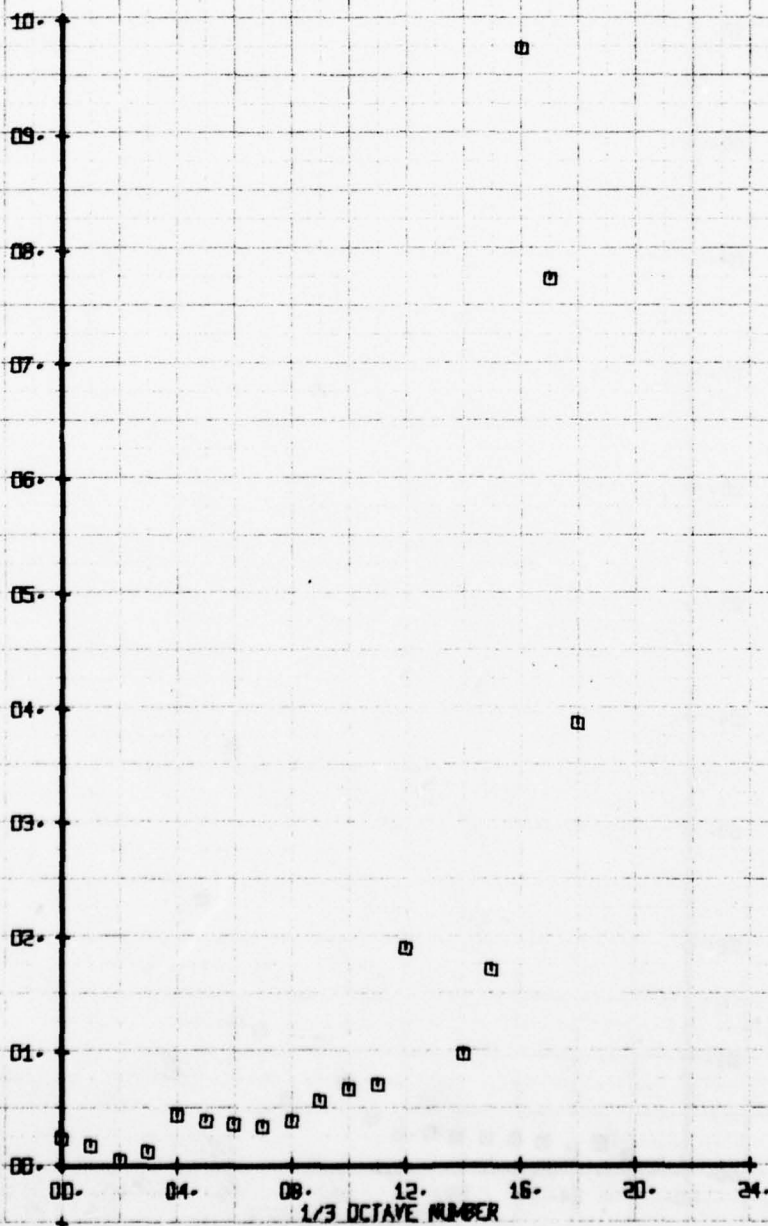
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 9

SYM  
 □

CH  
 74

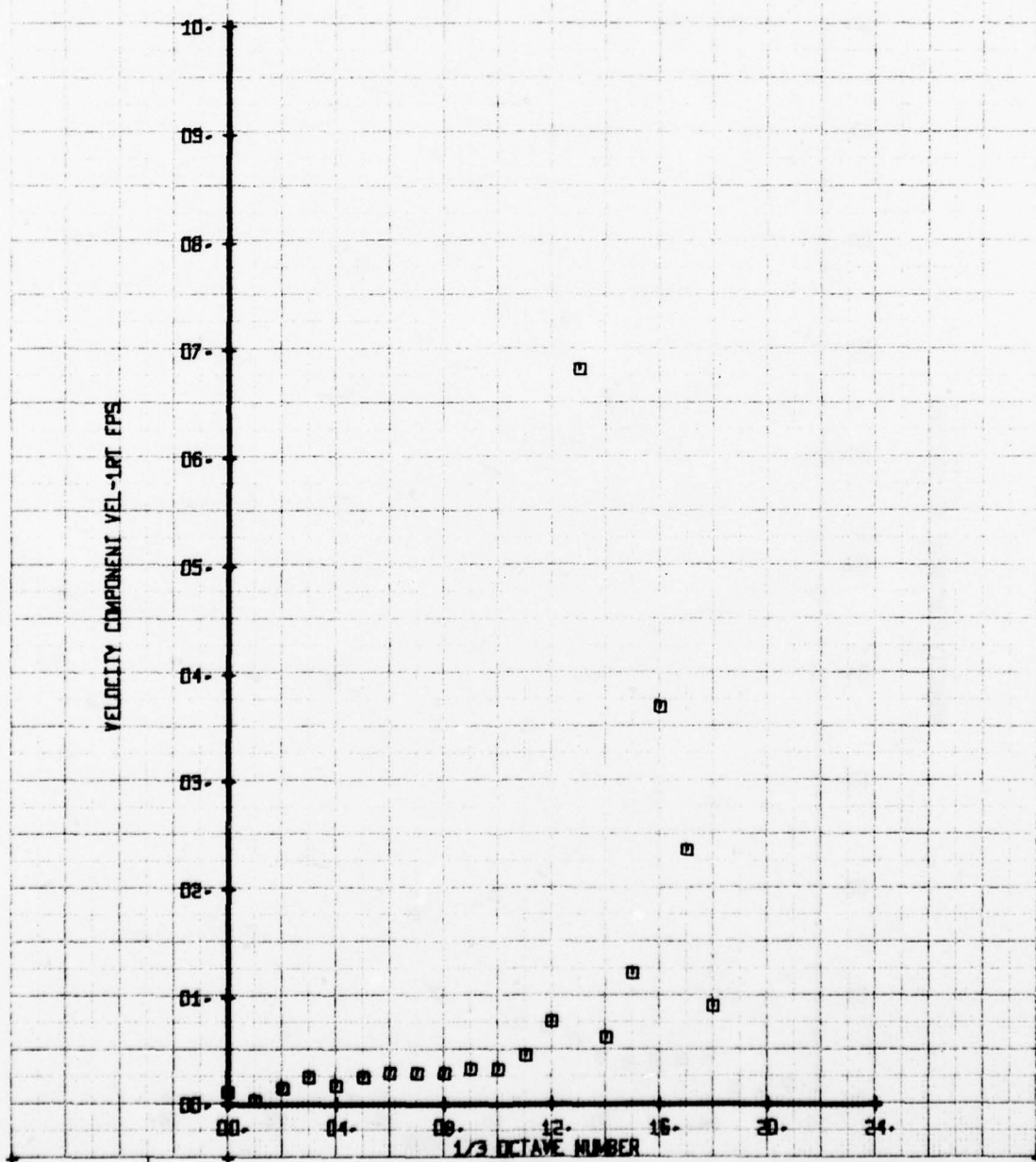
LEGEND  
 PARAMETER  
 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS



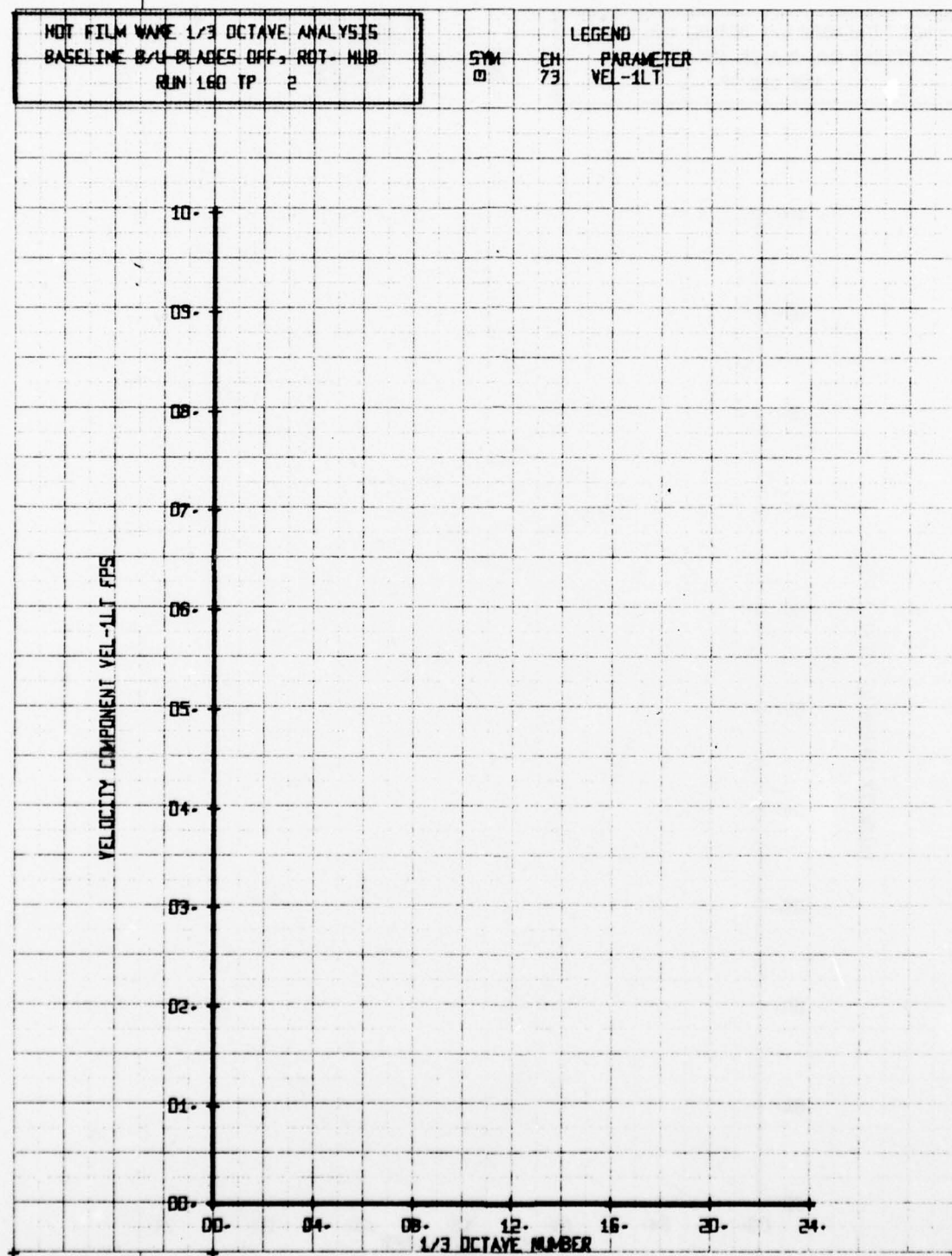
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE BUILD-UP MACELLES OFF  
RUN 149 TP 10

LEGEND  
SYM CH PARAMETER  
□ 74 VEL-1RT



NOT FILM WAVE 1/3 OCTAVE ANALYSIS  
BASELINE B/U BLADES OFF, ROT. HUB  
RUN 160 TP 2

LEGEND		
SYM	CH	PARAMETER
0	73	VEL-1LT



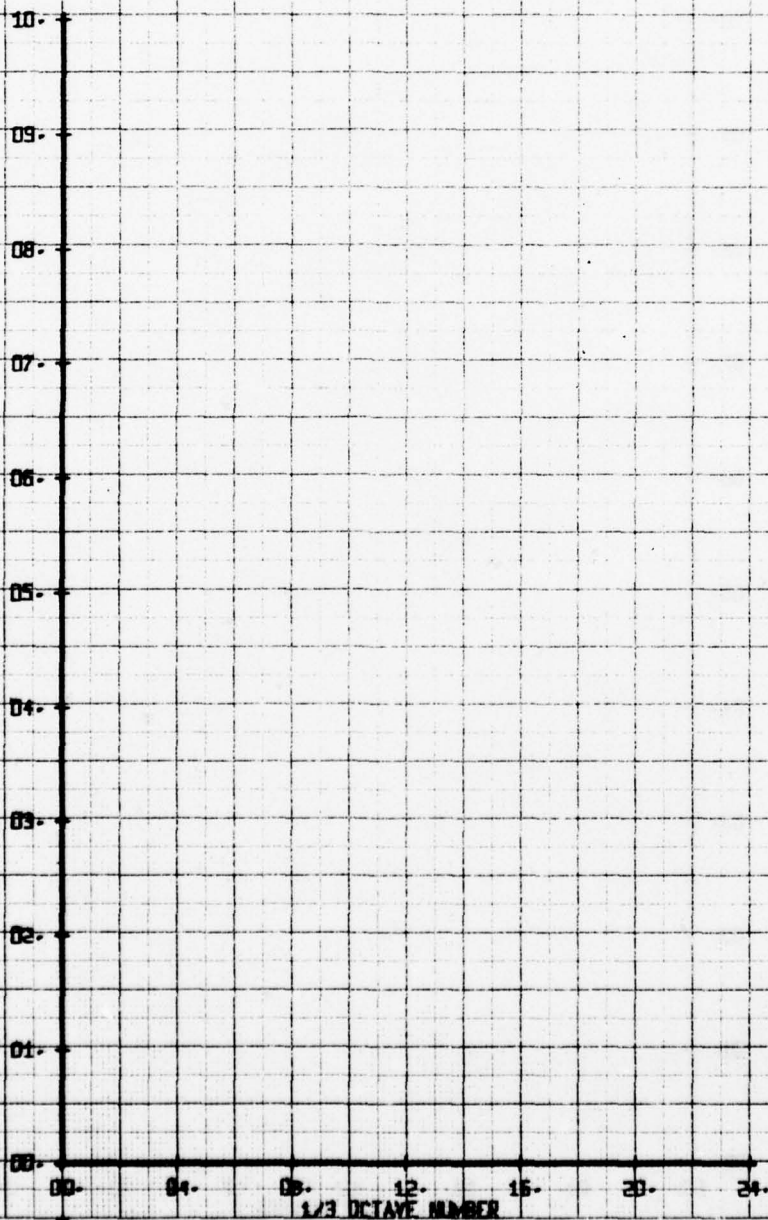
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE B/U BLADES OFF, ROT. HUB  
RUN 160 TP 3

SYM  
0

CH  
73

LEGEND  
PARAMETER  
VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS

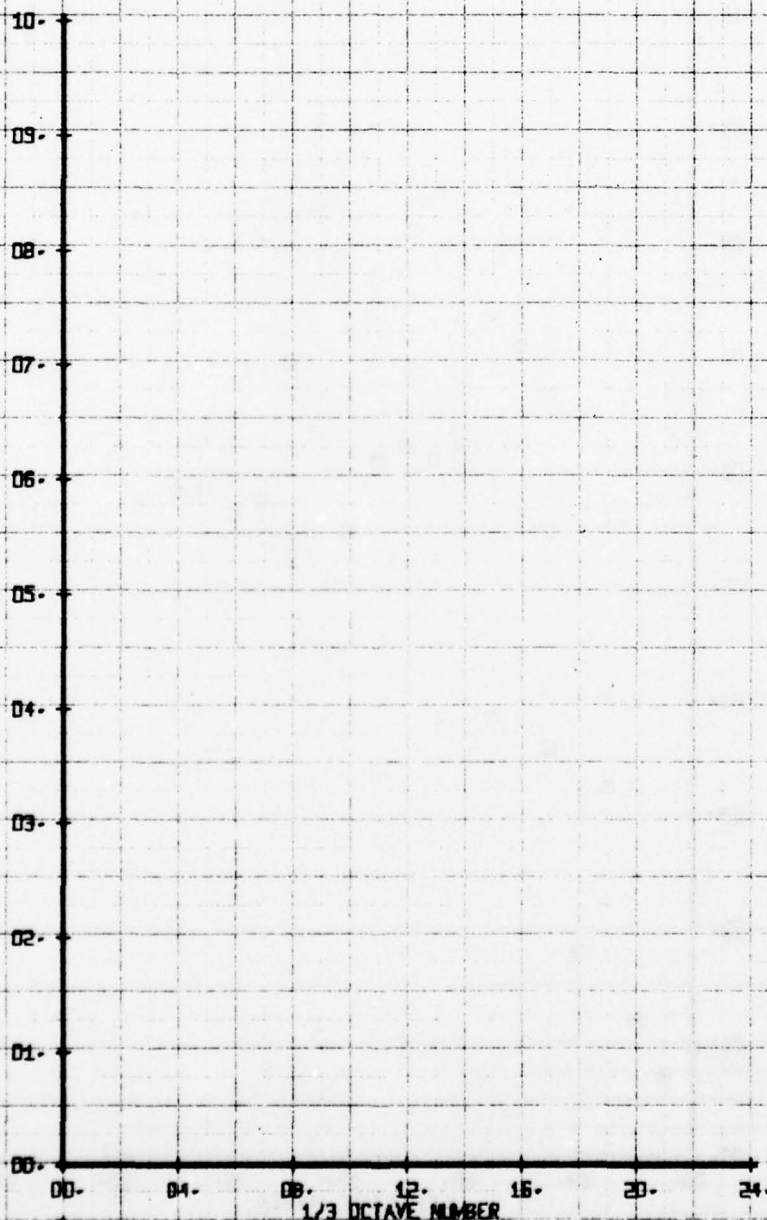




NOT FILM WAVE 1/3 OCTAVE ANALYSIS  
BASELINE 8/3 BLADES OFF, ROT. HUB  
RUN 180 TP 4

LEGEND		
SYM	CH	PARAMETER
□	73	VEL-1LT

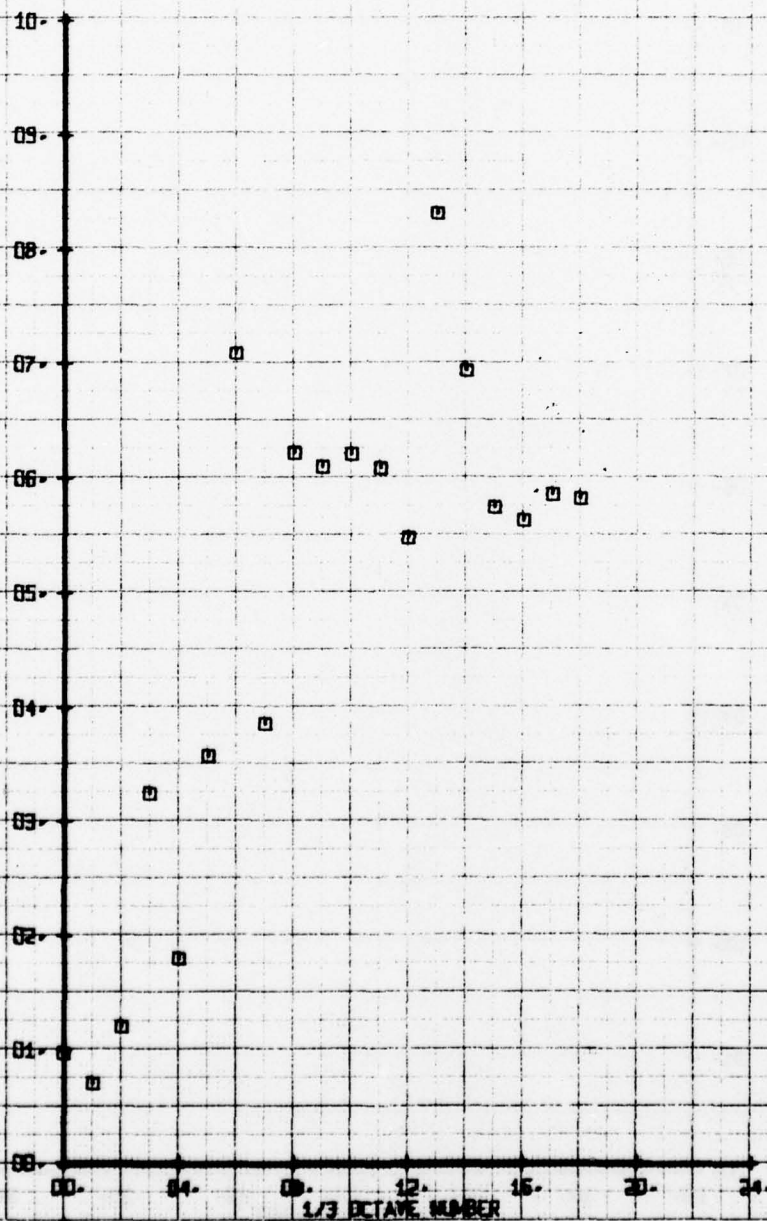
VELOCITY COMPONENT VEL-1LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, ROT. HUB  
 RUN 160 TP 5

SYM CH PARAMETER  
 0 73 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



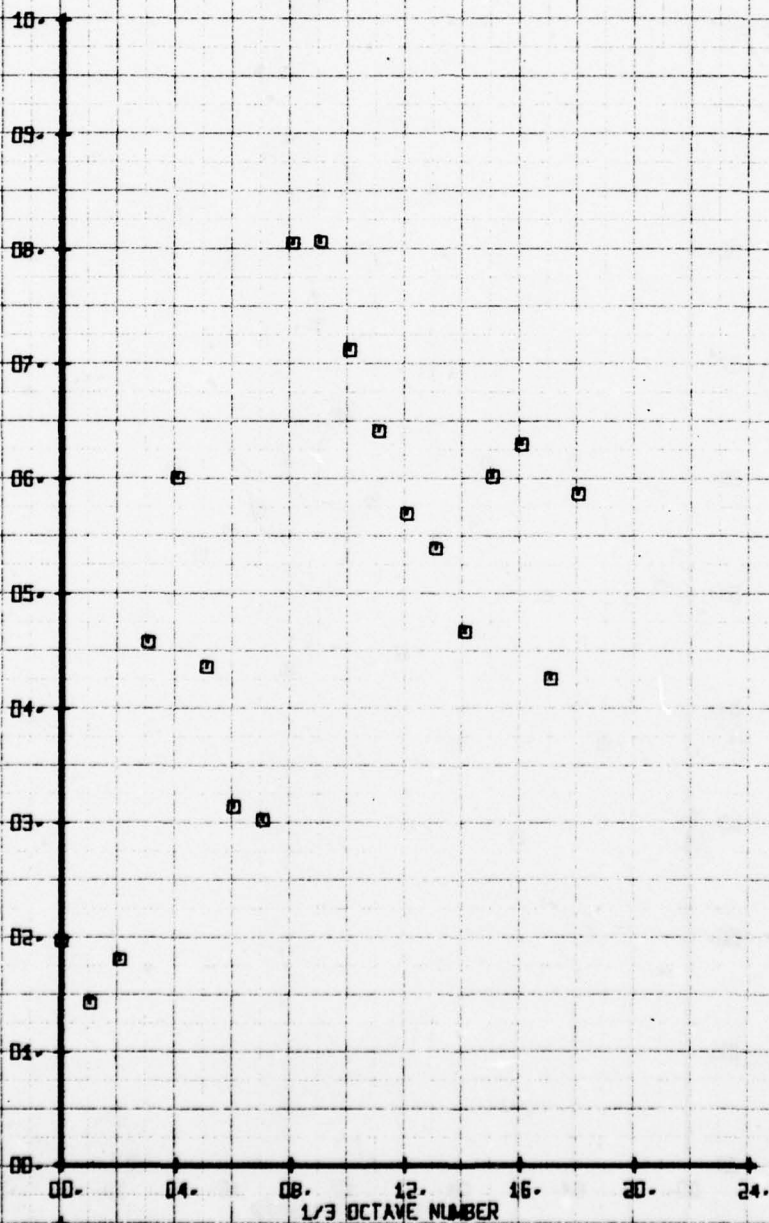
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/L-BLADES OFF, ROT. HUB  
 RUN 180 TP 6

SYM  
 □

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



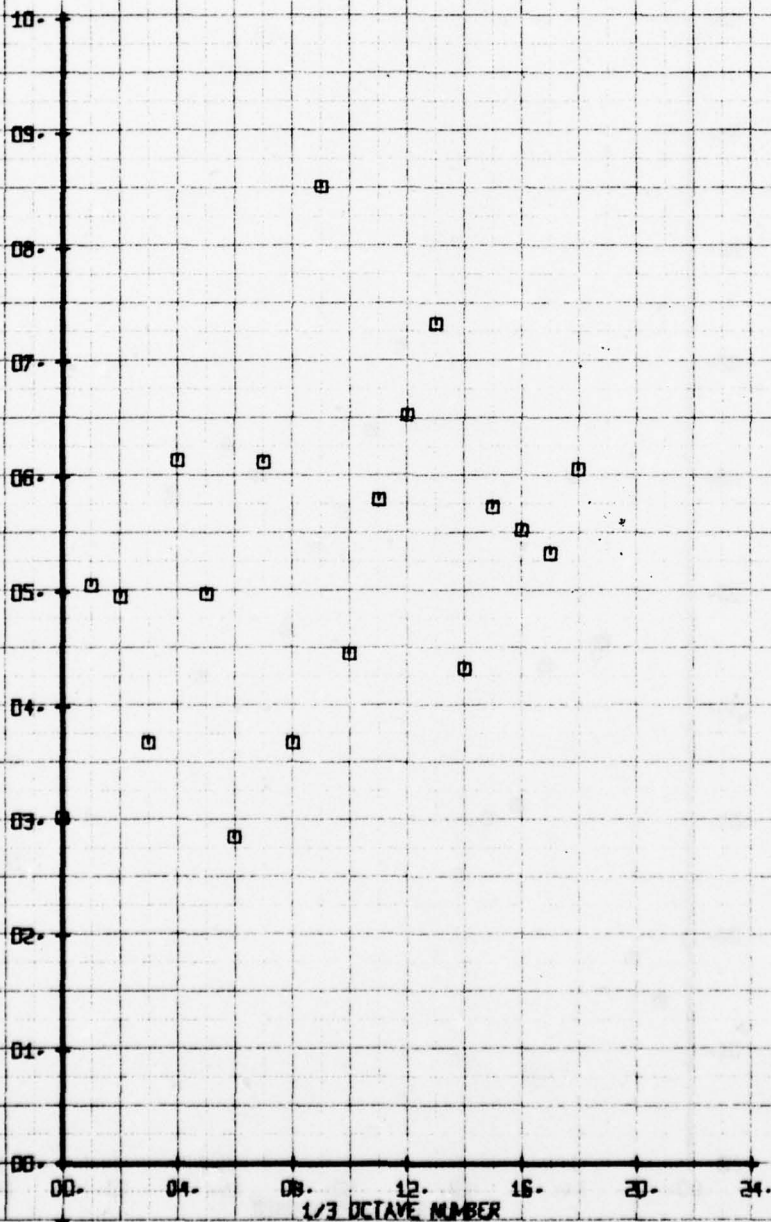
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 841-BLADES OFF, ROT- HUB  
 RUN 160 TP 7

SYM  
 □

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

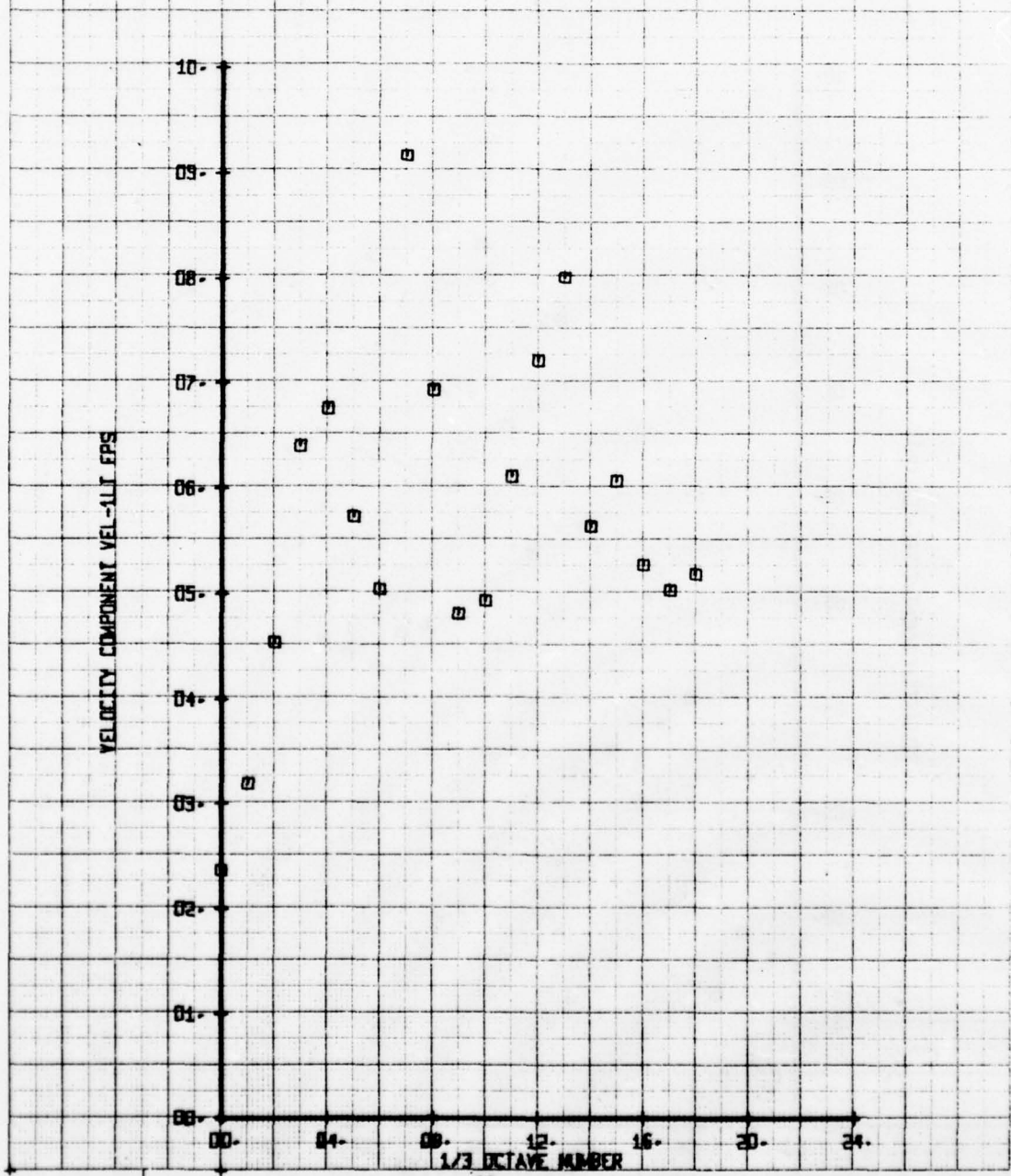
VELOCITY COMPONENT VEL-1LT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADGES OFF, ROT. HUB  
 RUN 160 TP B

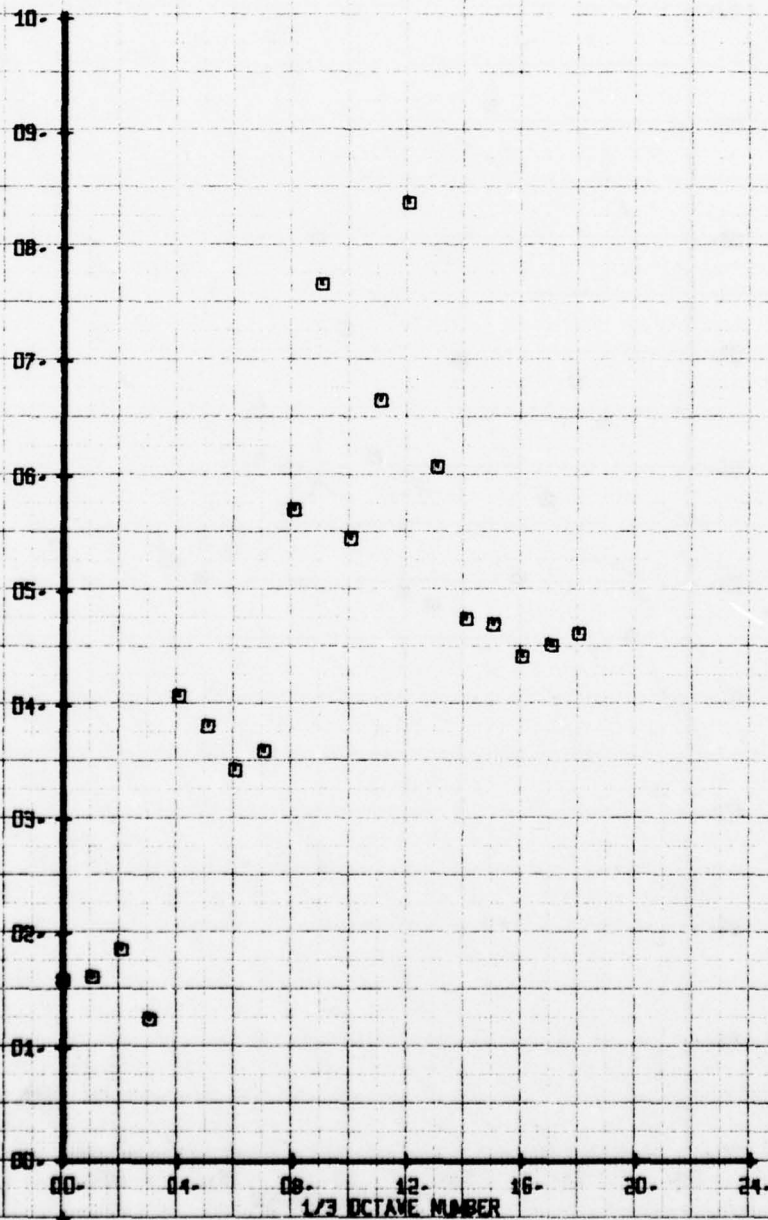
SYM	CM	LEGEND
□	73	PARAMETER
		VEL-1LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/4-BLADES OFF, ROT. HUB  
 RUN 160 TP 9

SYN CH PARAMETER  
 73 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



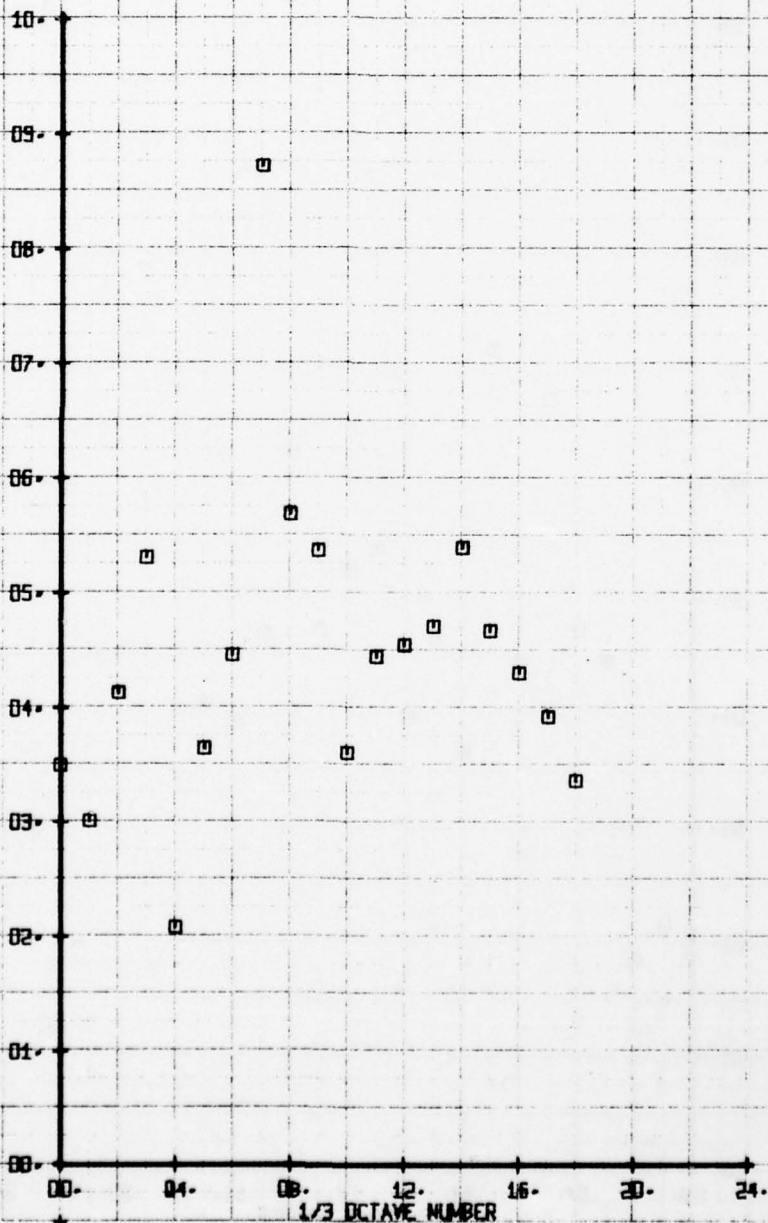
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES DEF  
 RUN 149 TP 2

SYM  
 0

CH  
 73

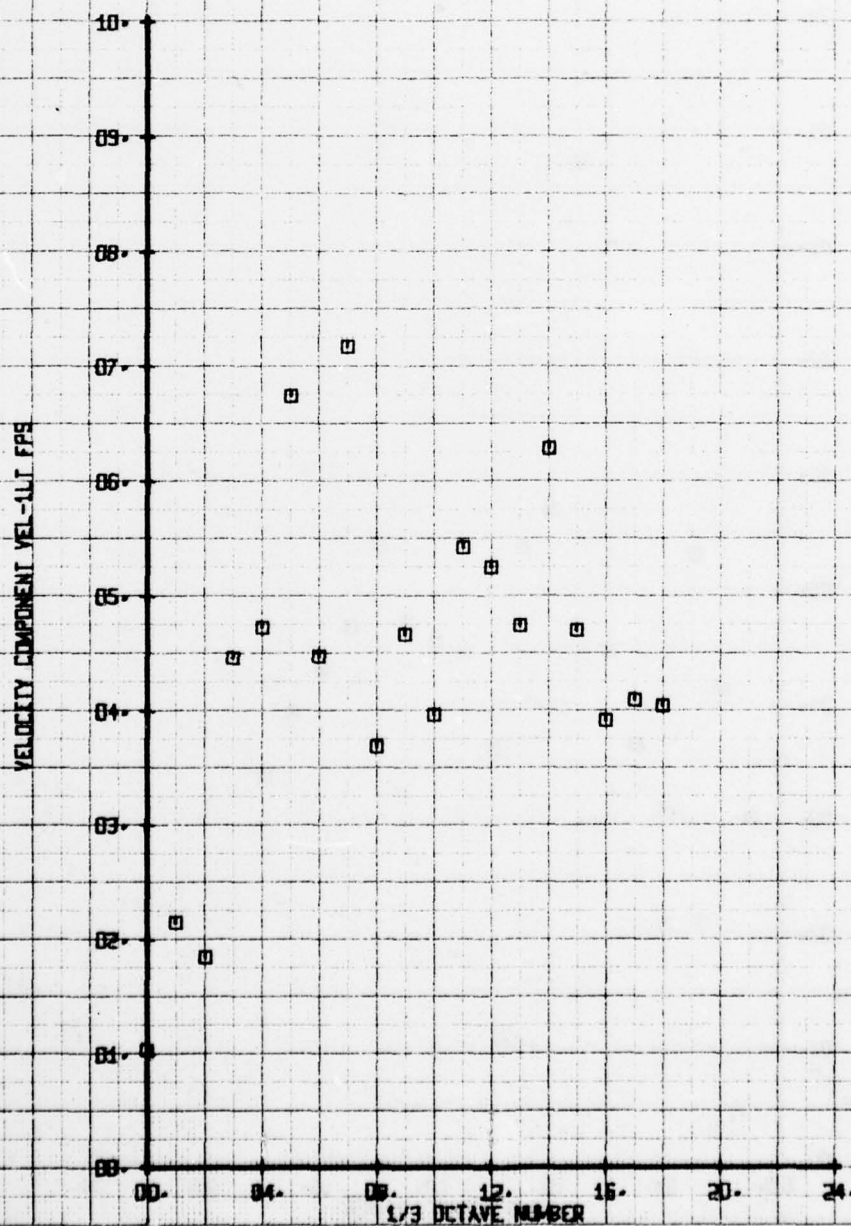
LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT EPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 3

SYM	CH	LEGEND	PARAMETER
□	73		VEL-1LT

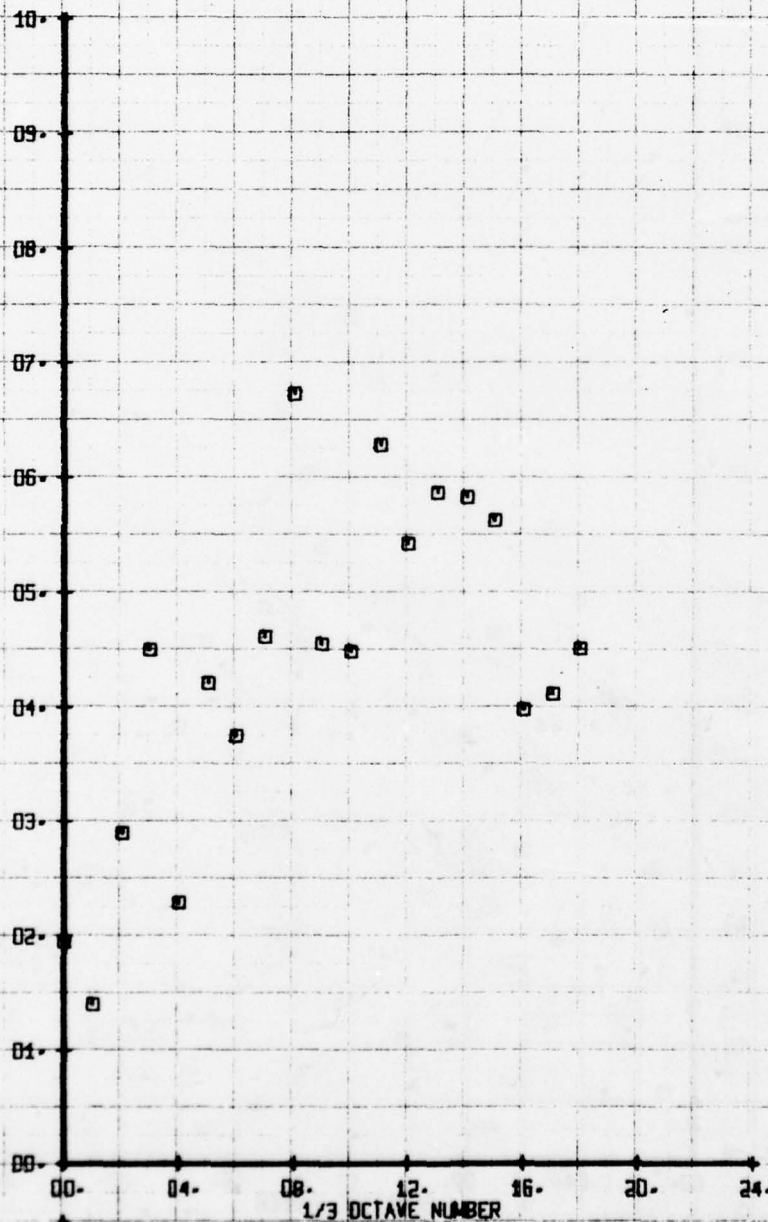




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 4

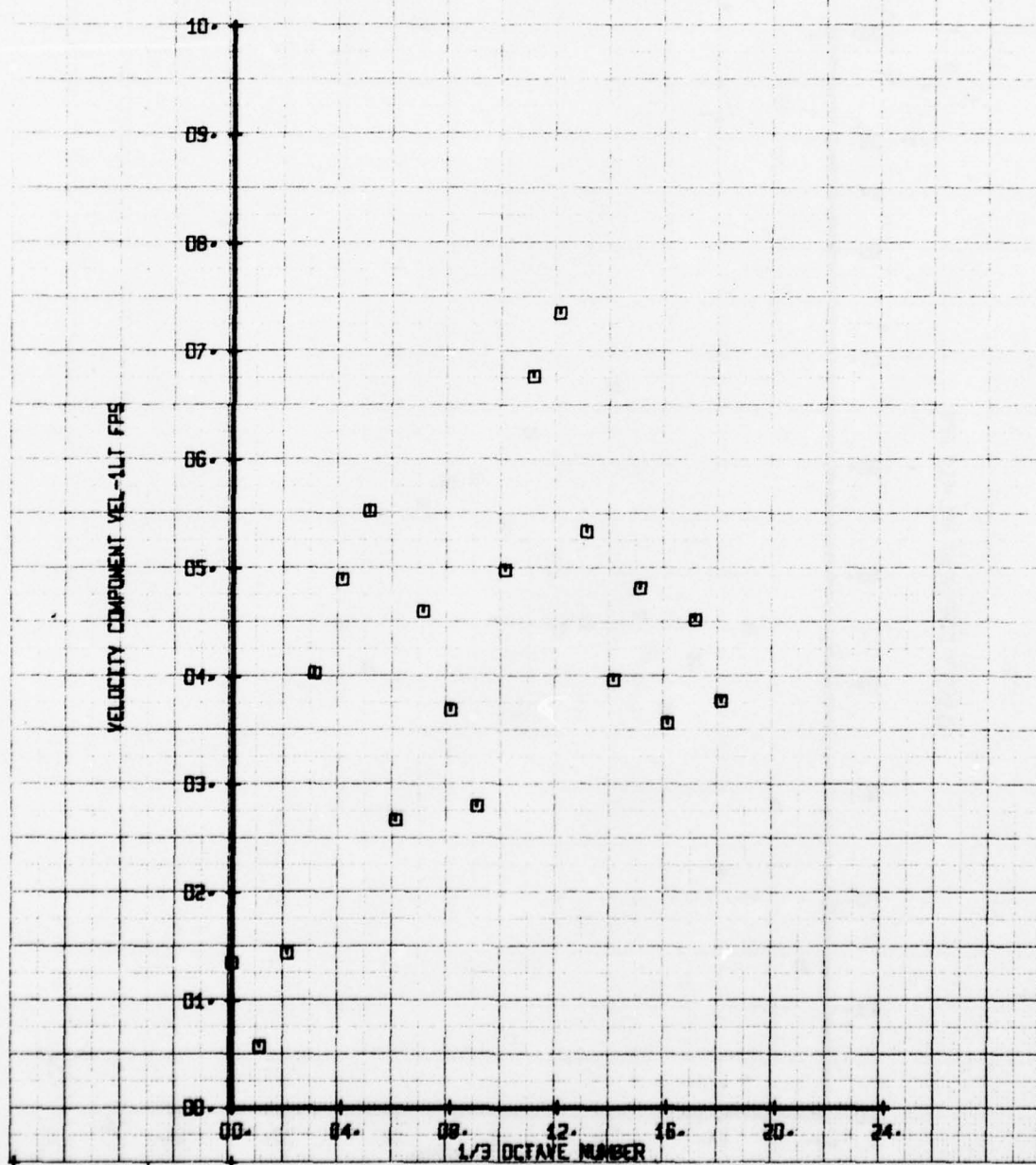
SYM	CH	PARAMETER
□	73	VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 5

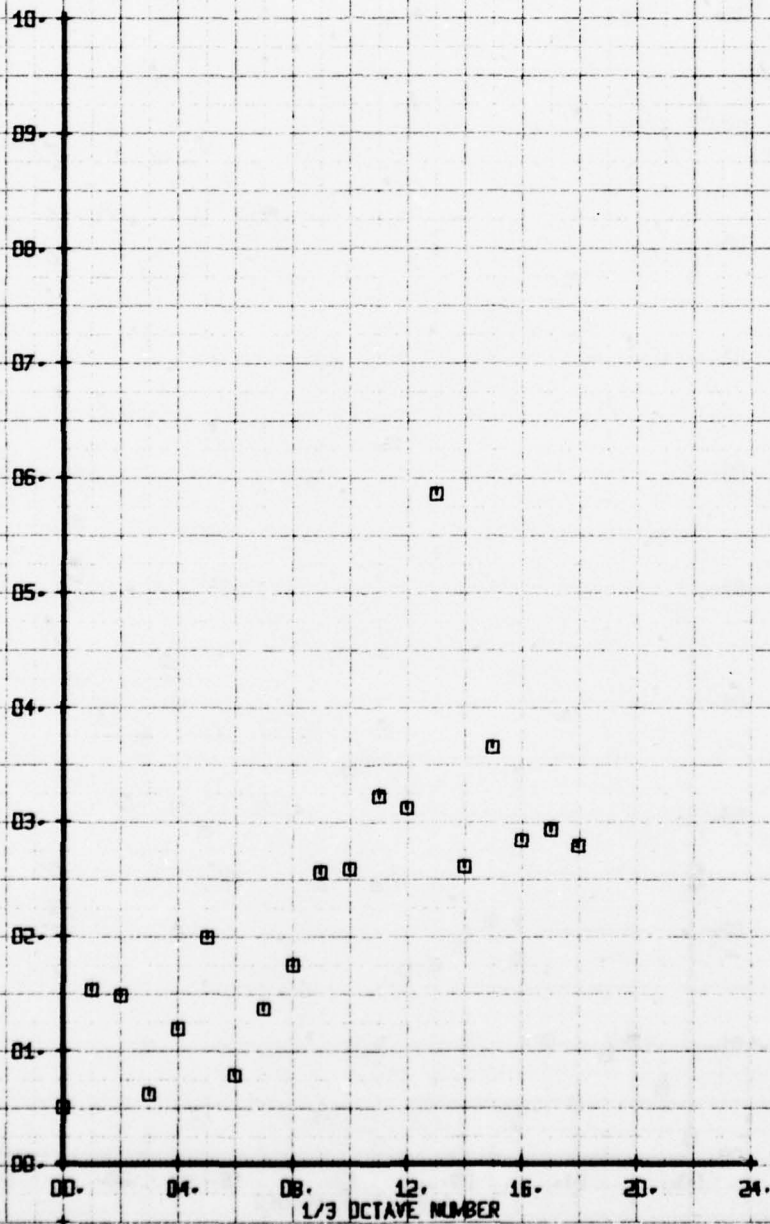
LEGEND  
 SYM CH PARAMETER  
 □ 73 VEL-1LT



HOT FILM WAVE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 6

SYM	CH	PARAMETER
□	73	VEL-1LT

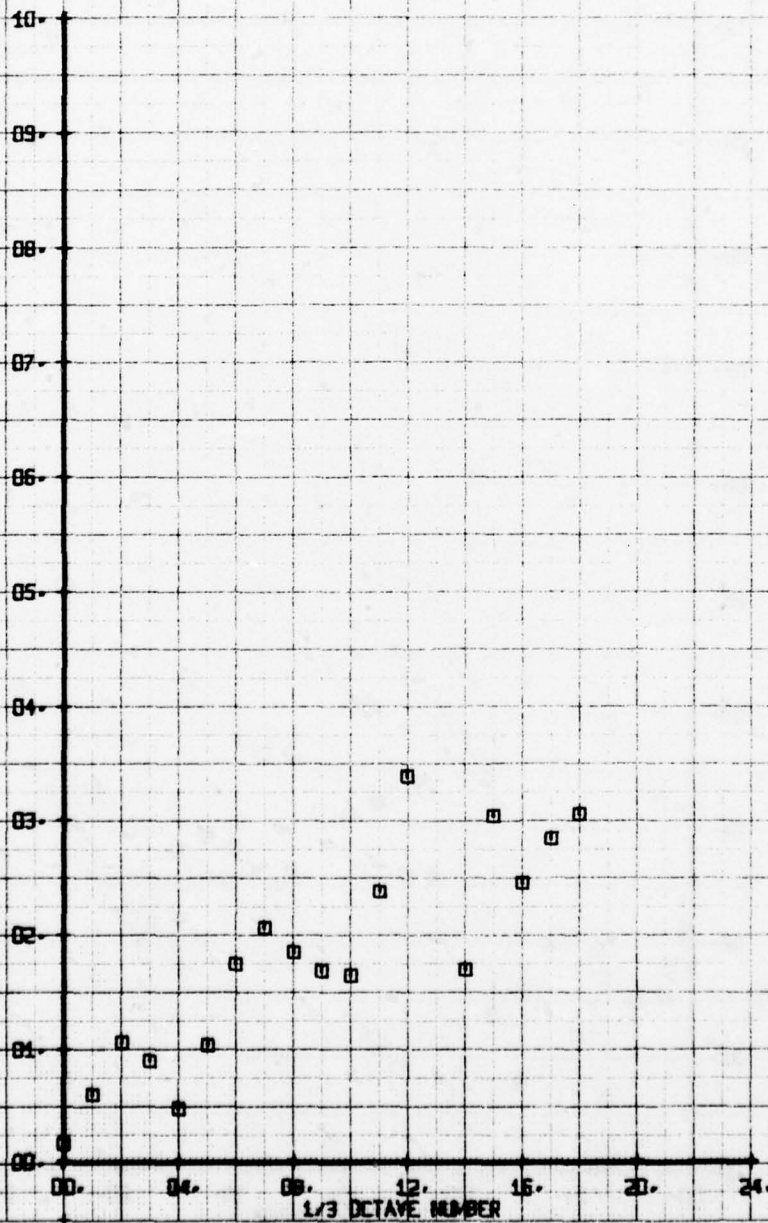
VELOCITY COMPONENT VEL-1LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES DEF  
 RUN 149 TP 7

SYM	CH	PARAMETER
□	73	VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS





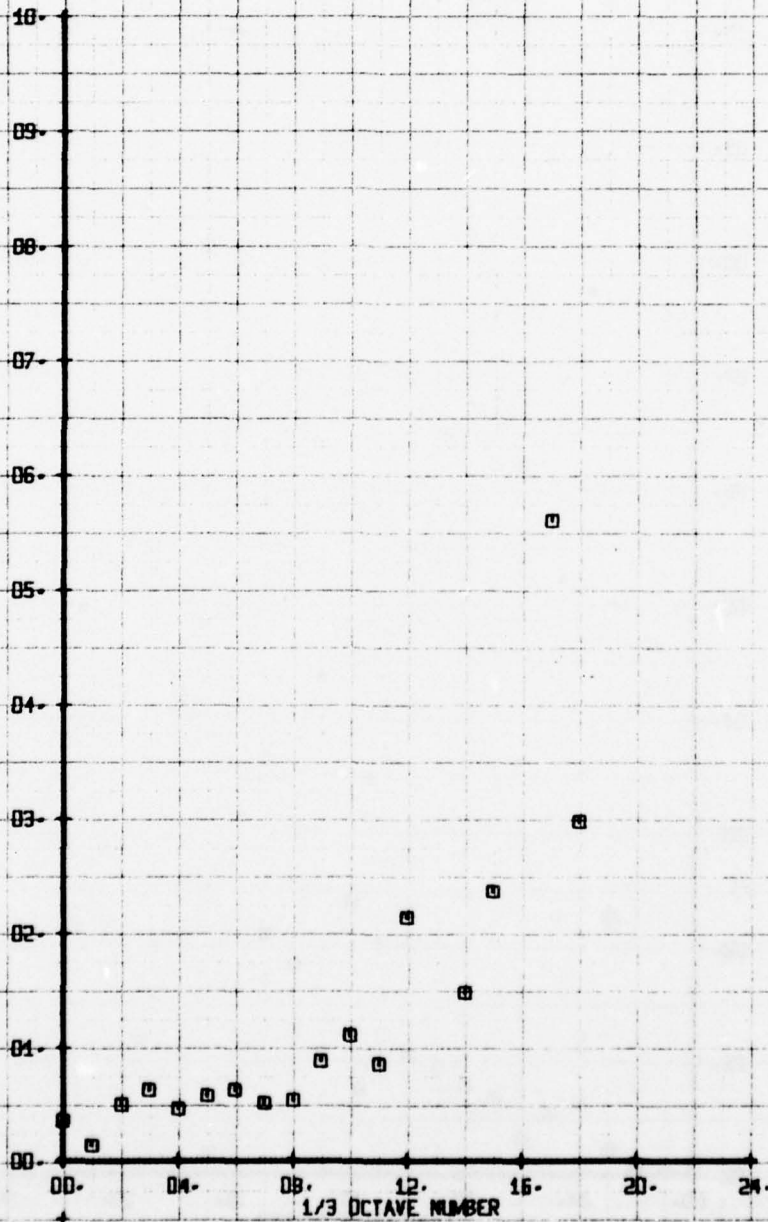
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 8

SYM  
 □

CH  
 73

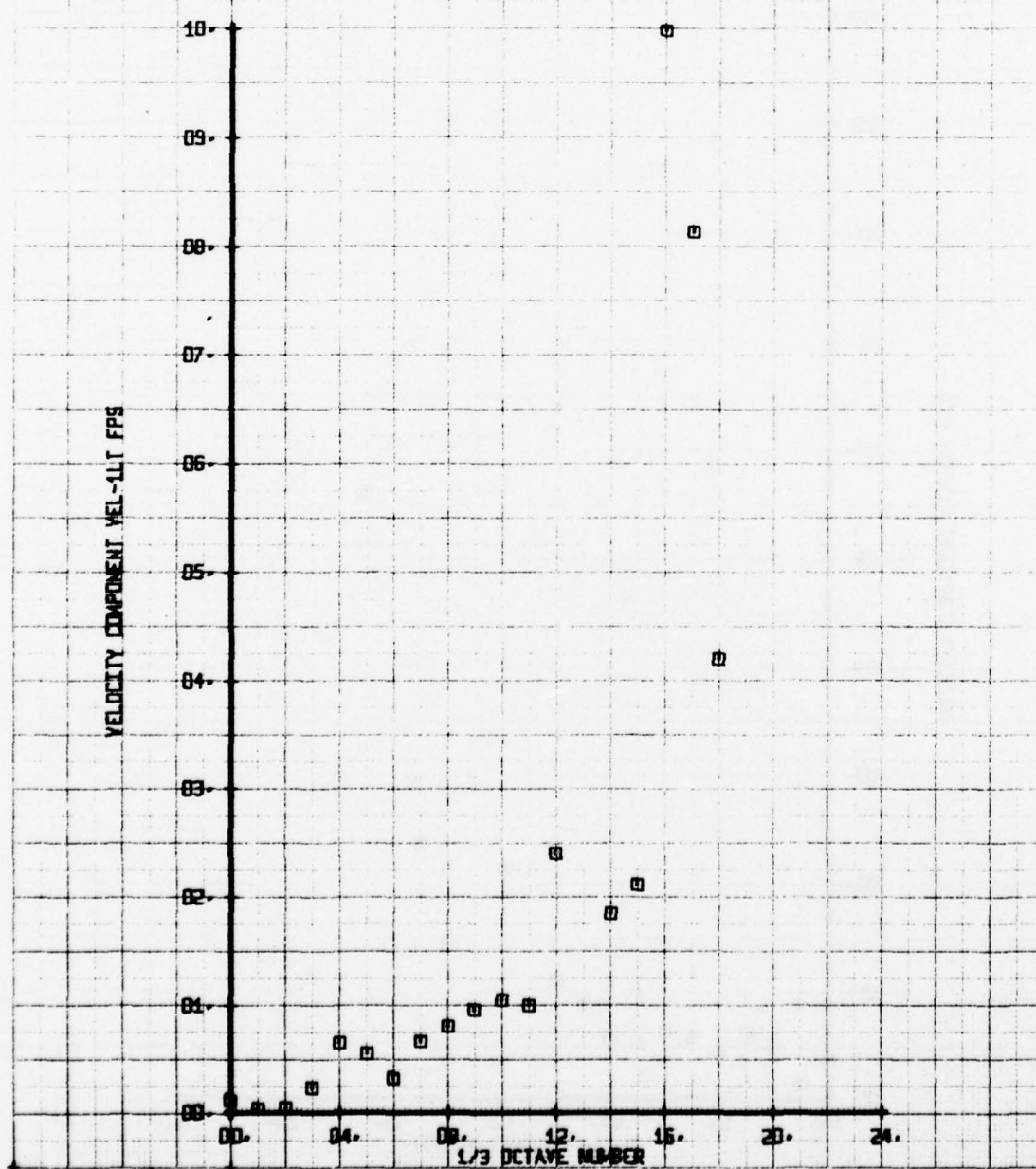
LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 9

SYM	CH	LEGEND
□	73	PARAMETER VEL-1LT



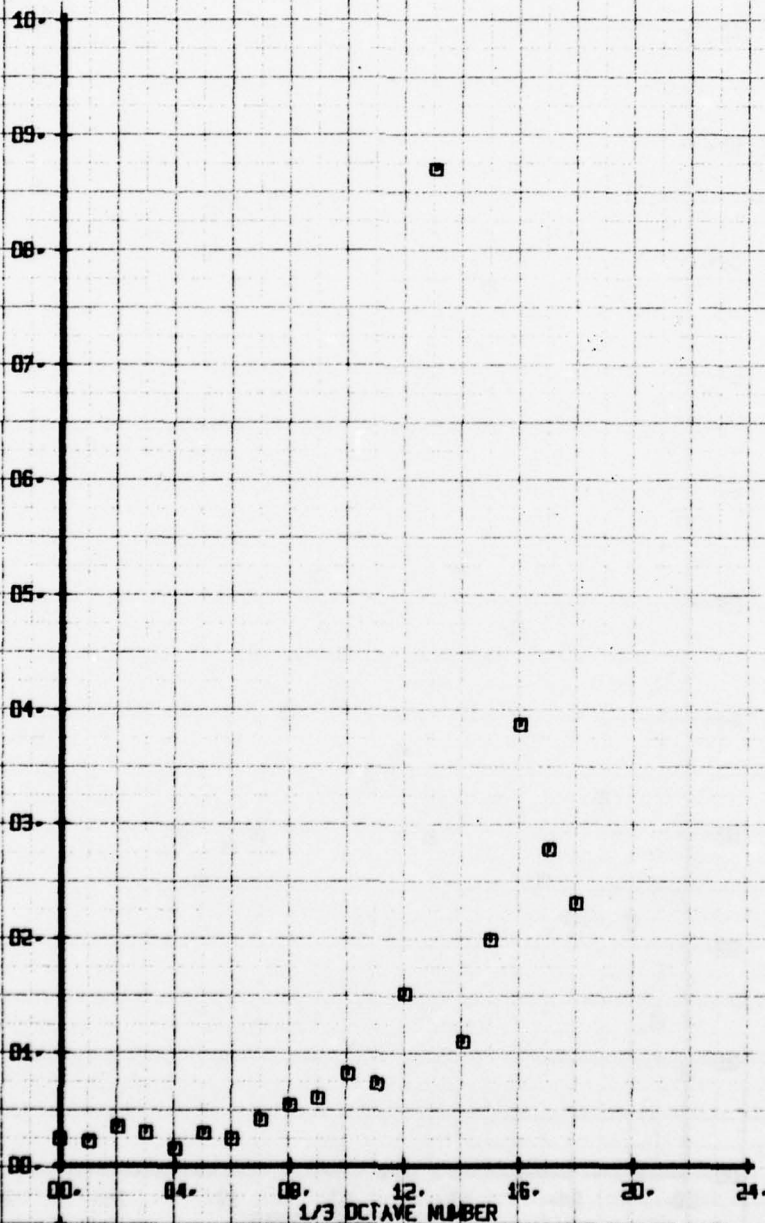
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES DEF  
 RUN 149 TP 10

SYM  
 0

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



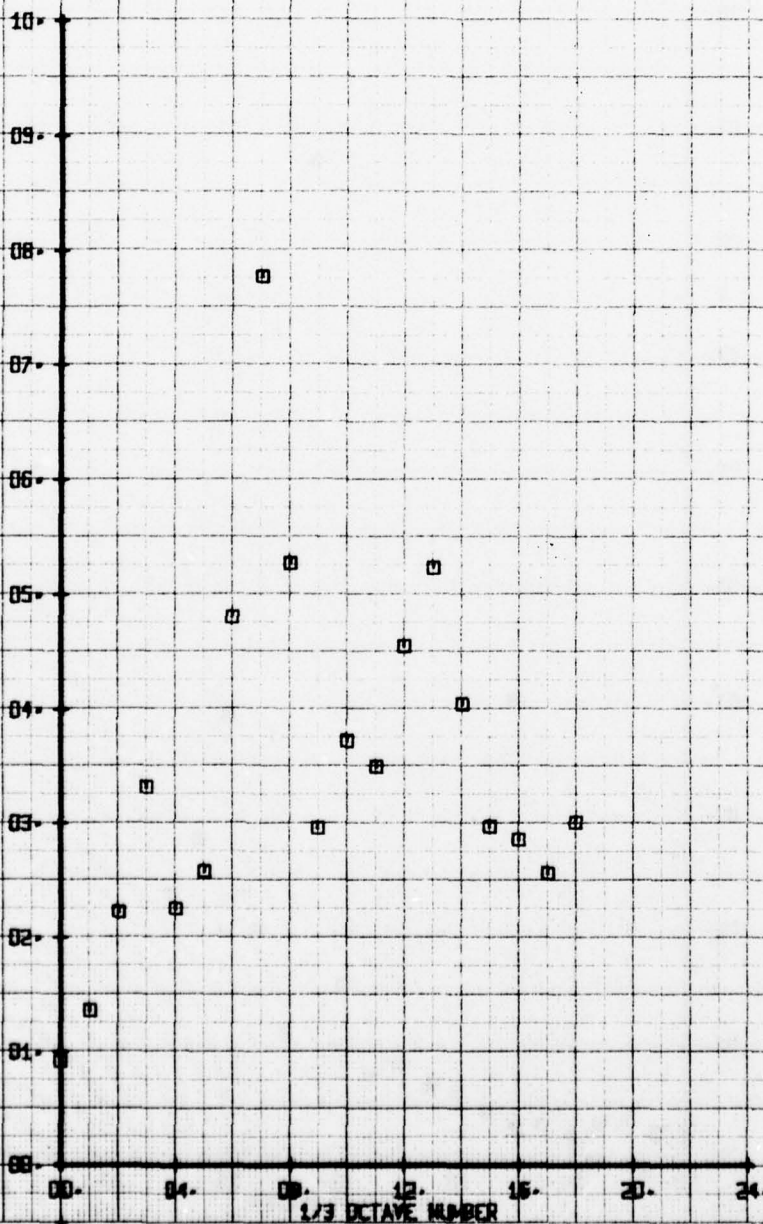
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE BUILD-UP NACELLES OFF  
RUN 149 TP 2

SYM  
□

CN  
72

LEGEND  
PARAMETER  
VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS





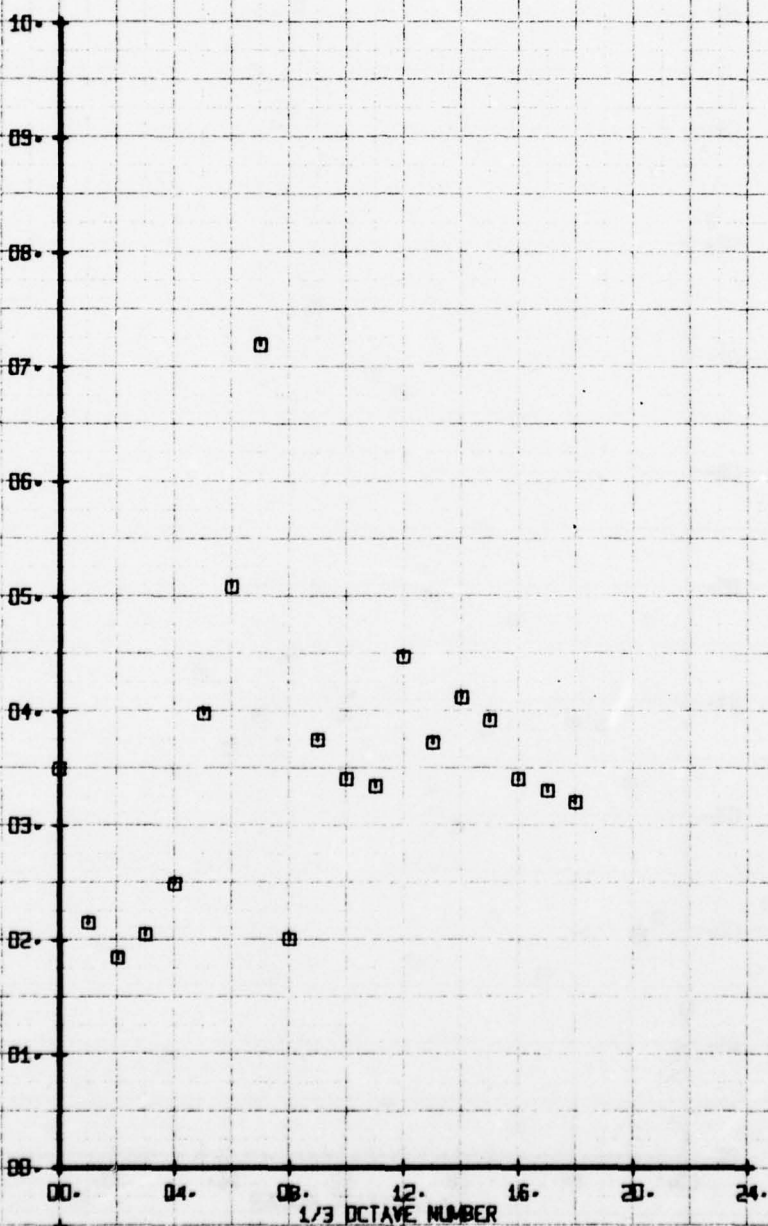
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 3

SYM  
 □

CH  
 72

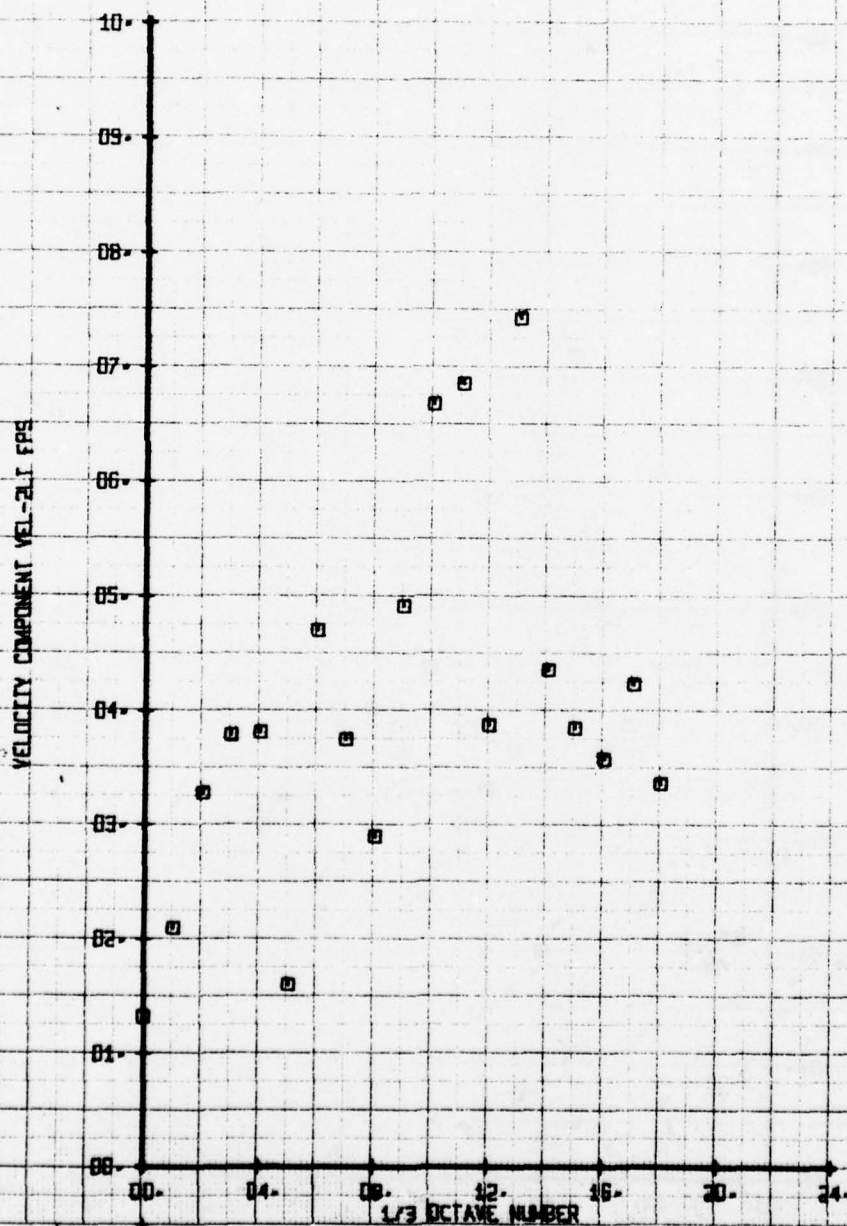
LEGEND  
 PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 4

LEGEND  
 CH 72  
 PARAMETER  
 VEL-2LT



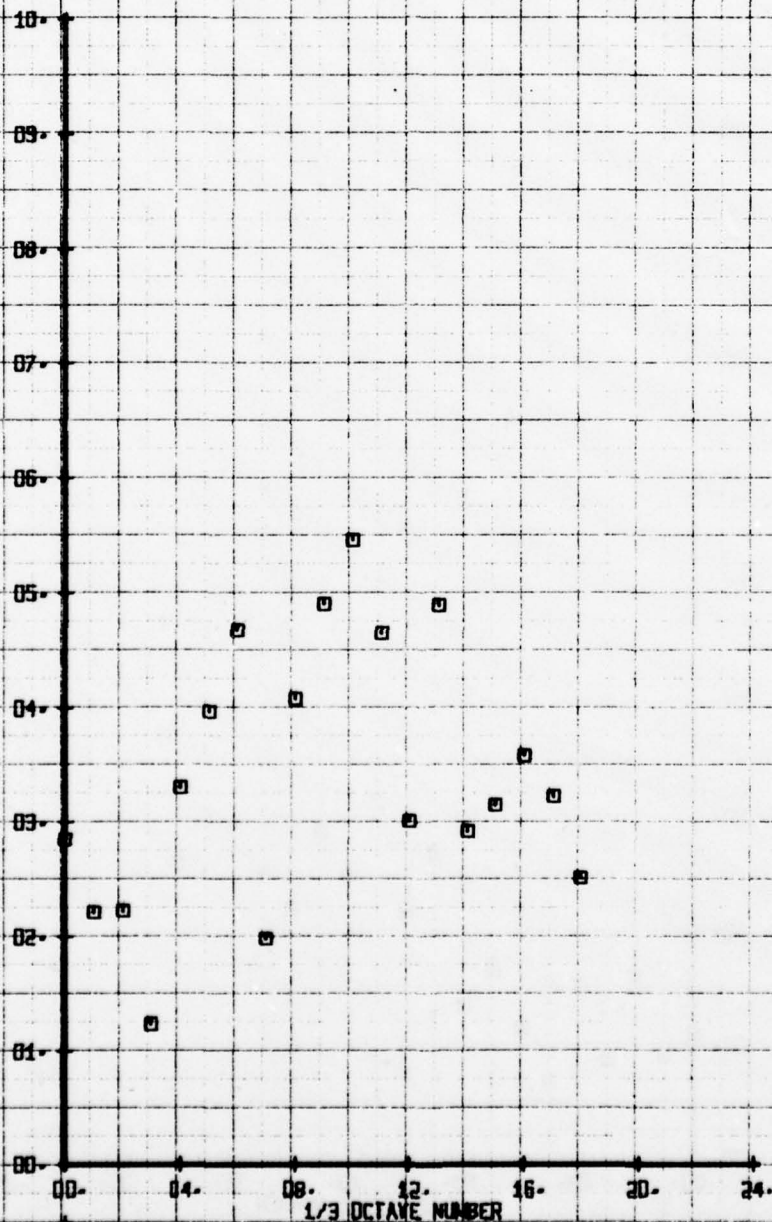
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 5

SYM  
 □

CH  
 72

LEGEND  
 PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS



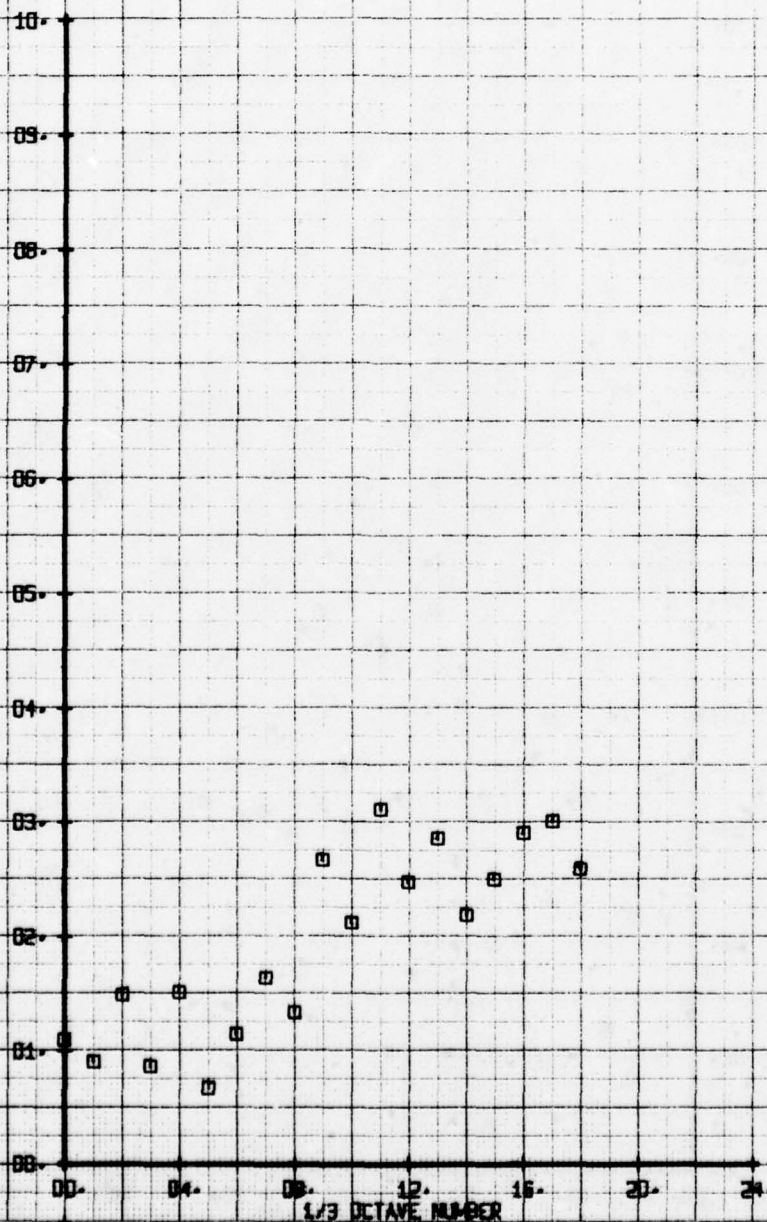
1/3 OCTAVE NUMBER

HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 6

SYM  
 □

LEGEND  
 CH 72  
 PARAMETER  
 VEL-2LT

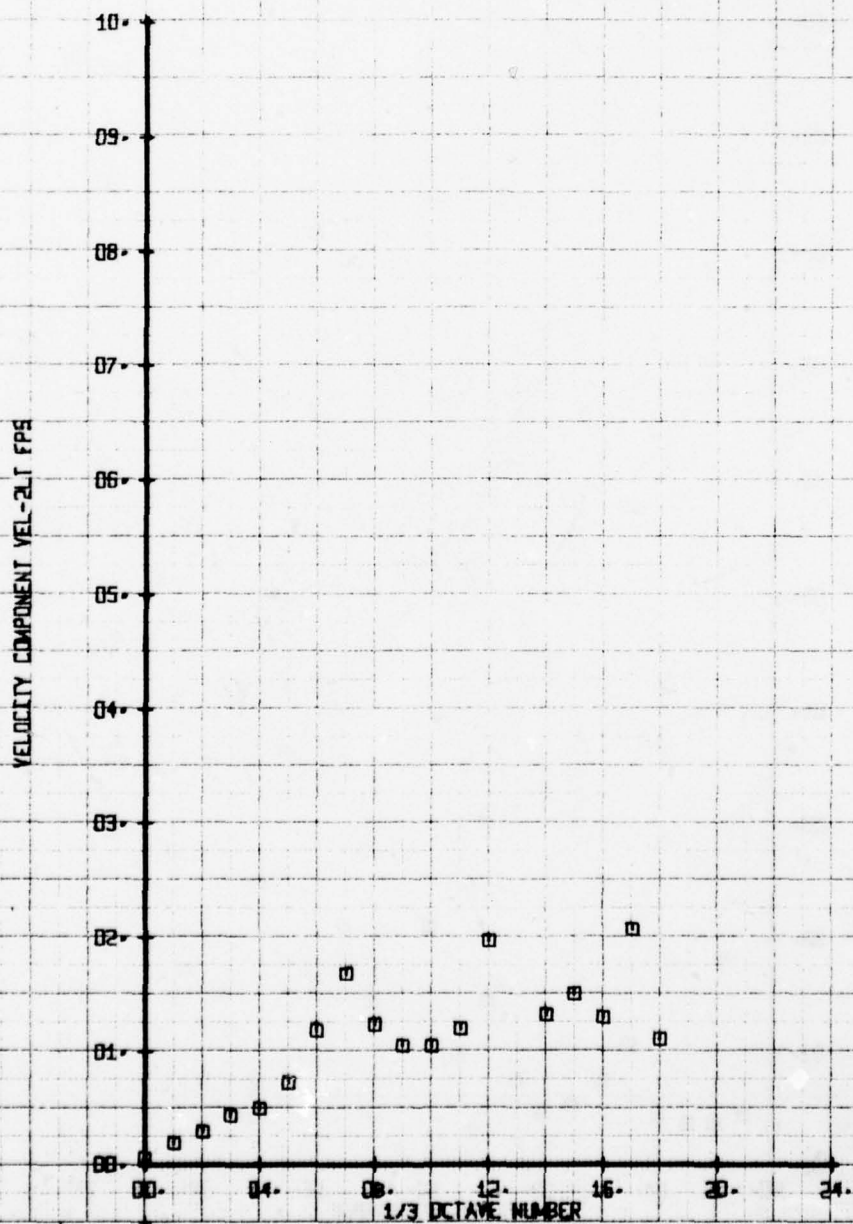
VELOCITY COMPONENT VEL-2LT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 7

LEGEND  
 SYM CH PARAMETER  
 □ 72 VEL-2LT



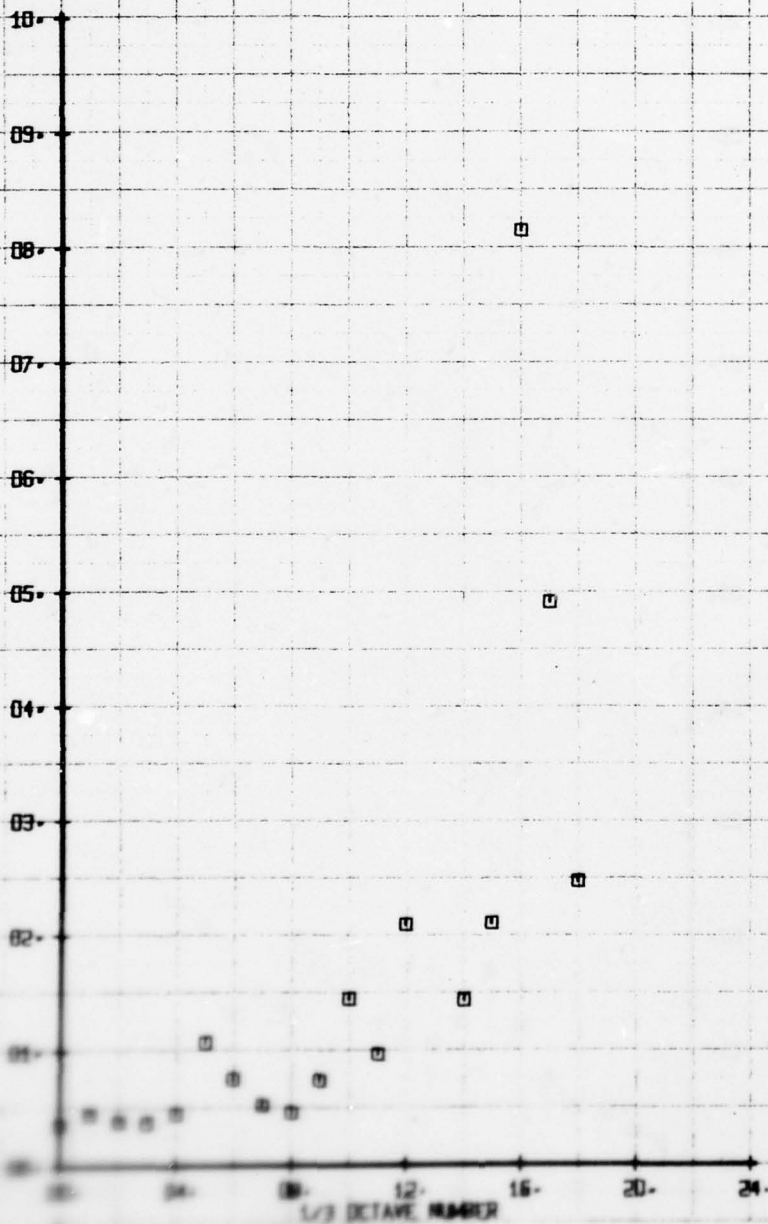
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE BUILD-UP NACELLES OFF  
RUN 149 TP 8

SYM  
□

CH  
72

LEGEND  
PARAMETER  
VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS

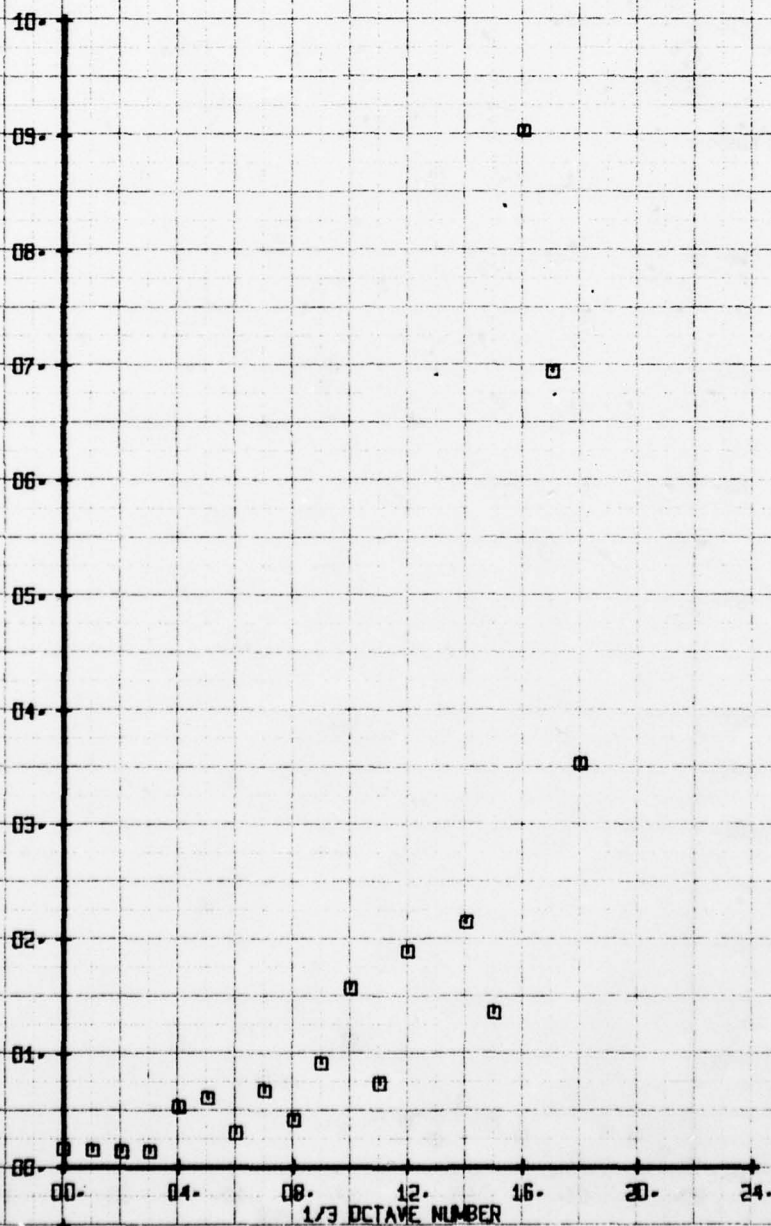


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 9

SYM  
 □

LEGEND  
 CH 72  
 PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT EPS



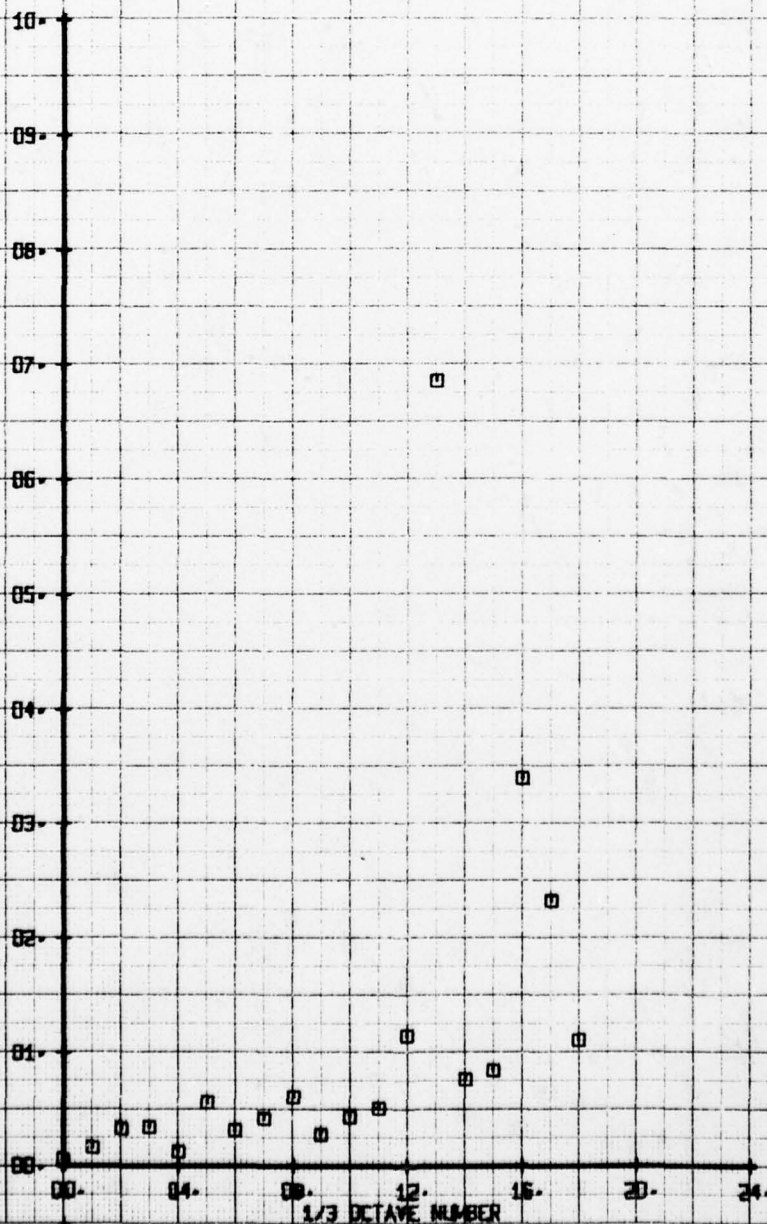
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 10

SYM  
 □

CH  
 72

LEGEND  
 PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS

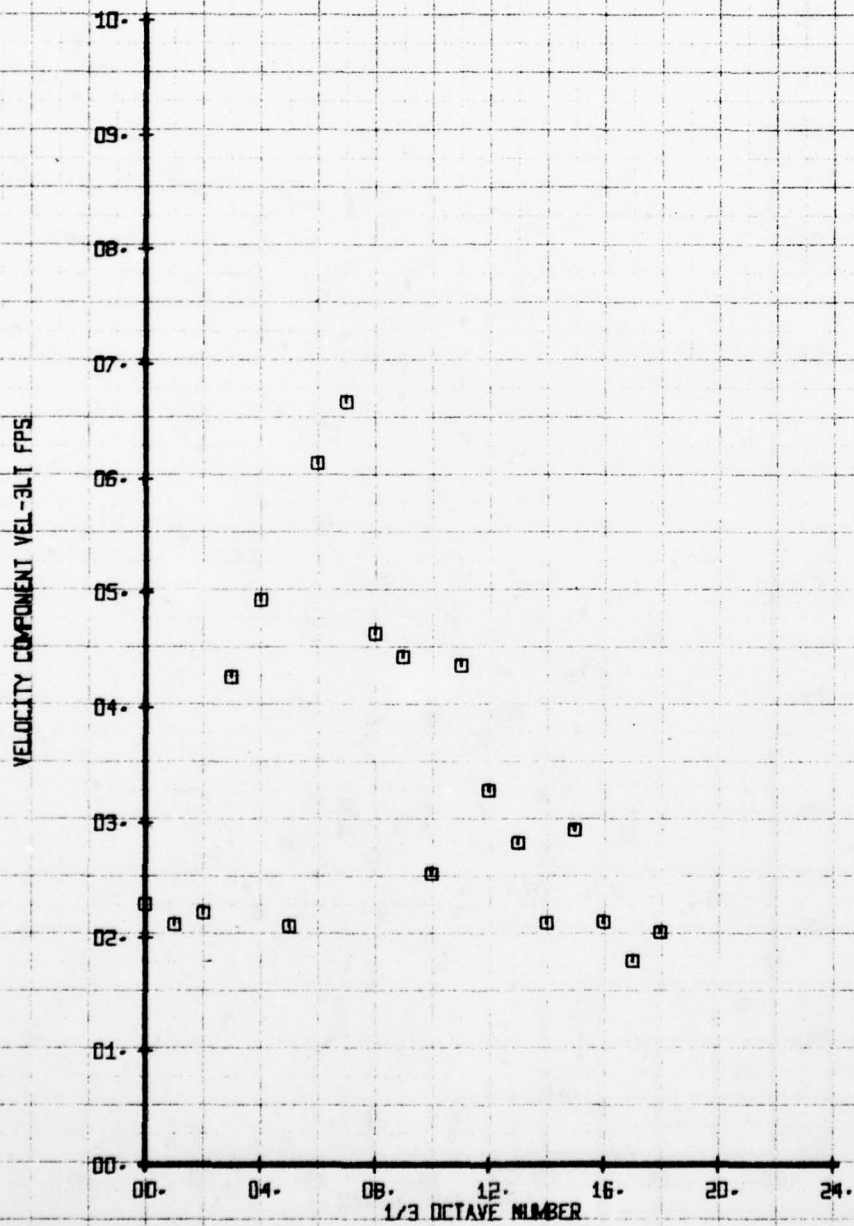


1/3 OCTAVE NUMBER



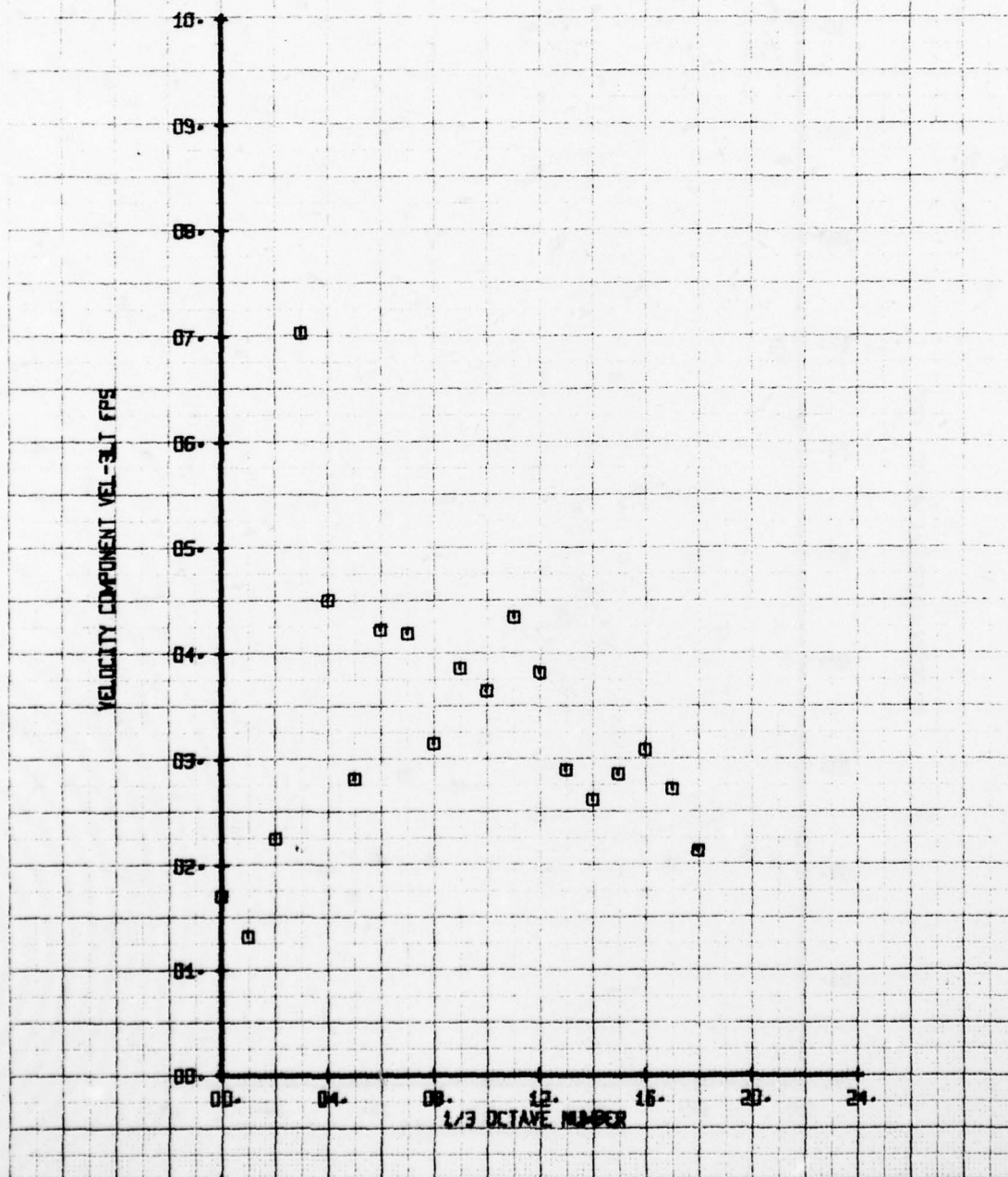
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 2

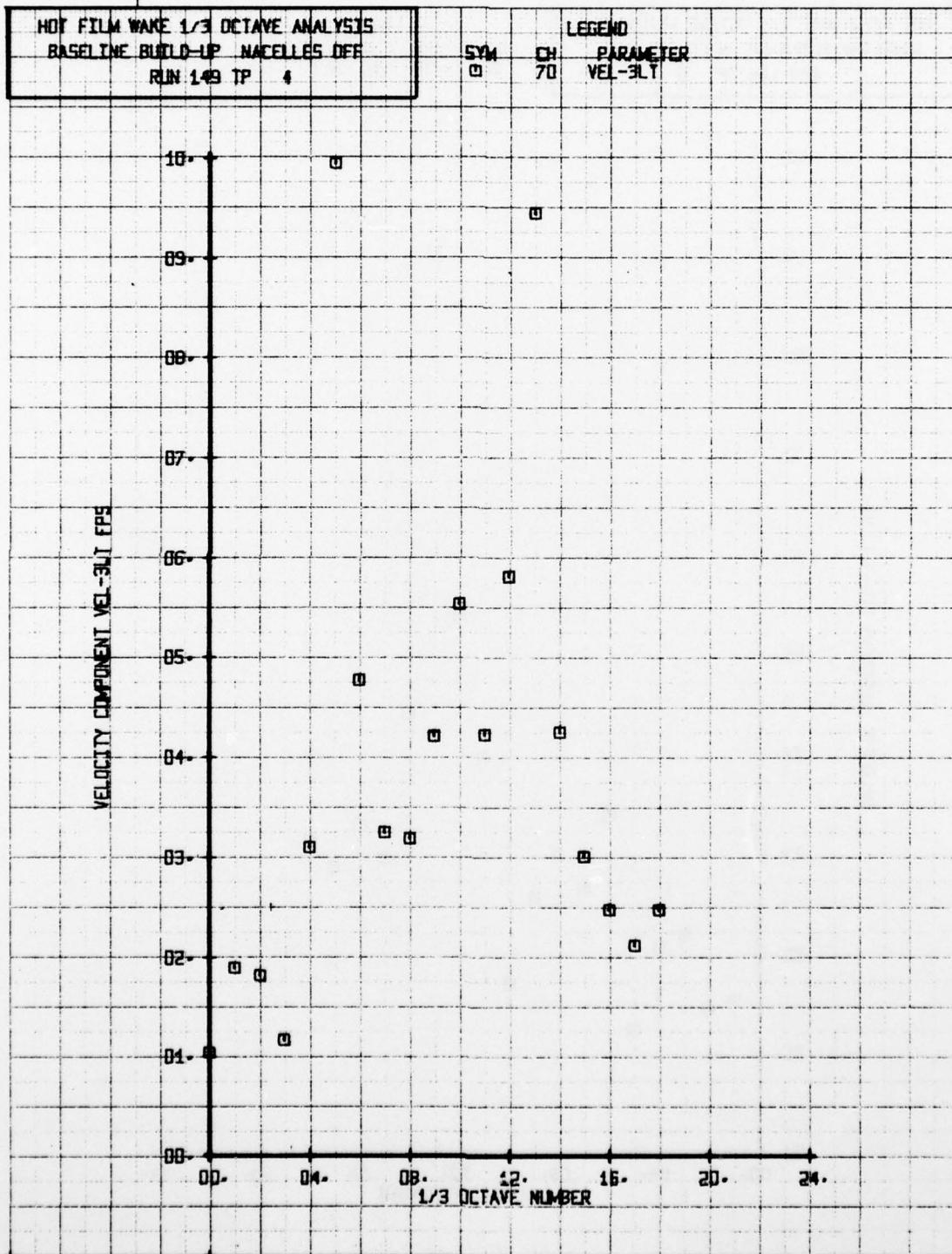
SYM	CH	LEGEND
0	70	PARAMETER
		VEL-3LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 3

SYN CH PARAMETER  
 □ 70 VEL-3LT





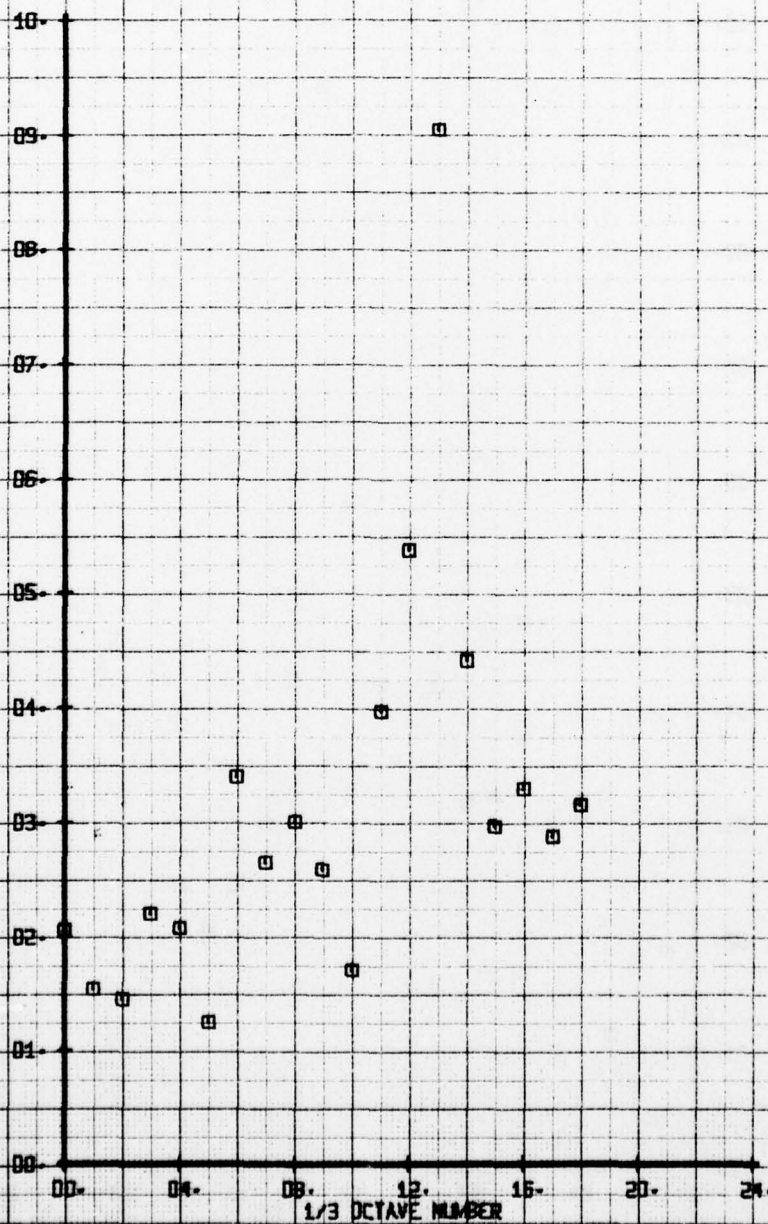
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES DEF  
 RUN 149 TP 5

SYM  
 □

CH  
 70

LEGEND  
 PARAMETER  
 VEL-3LT

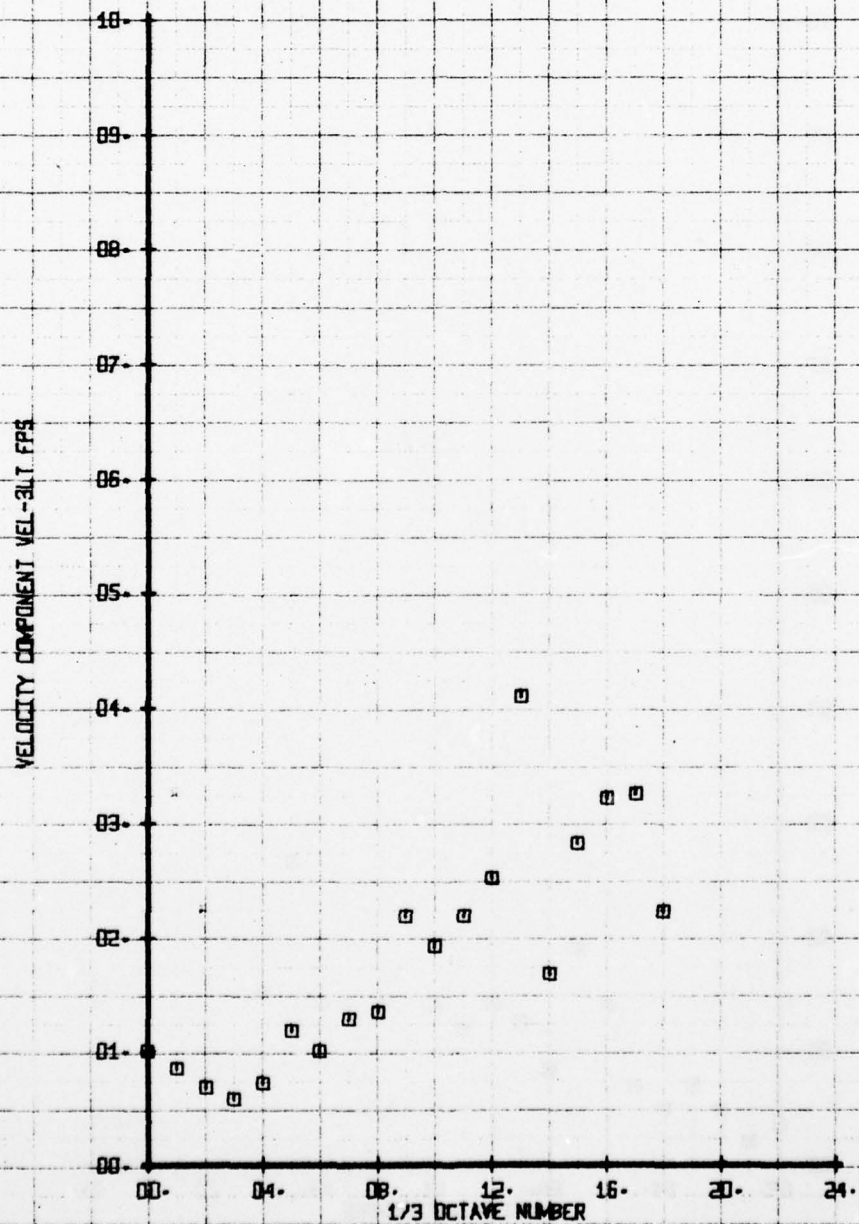
VELOCITY COMPONENT VEL-3LT FPS





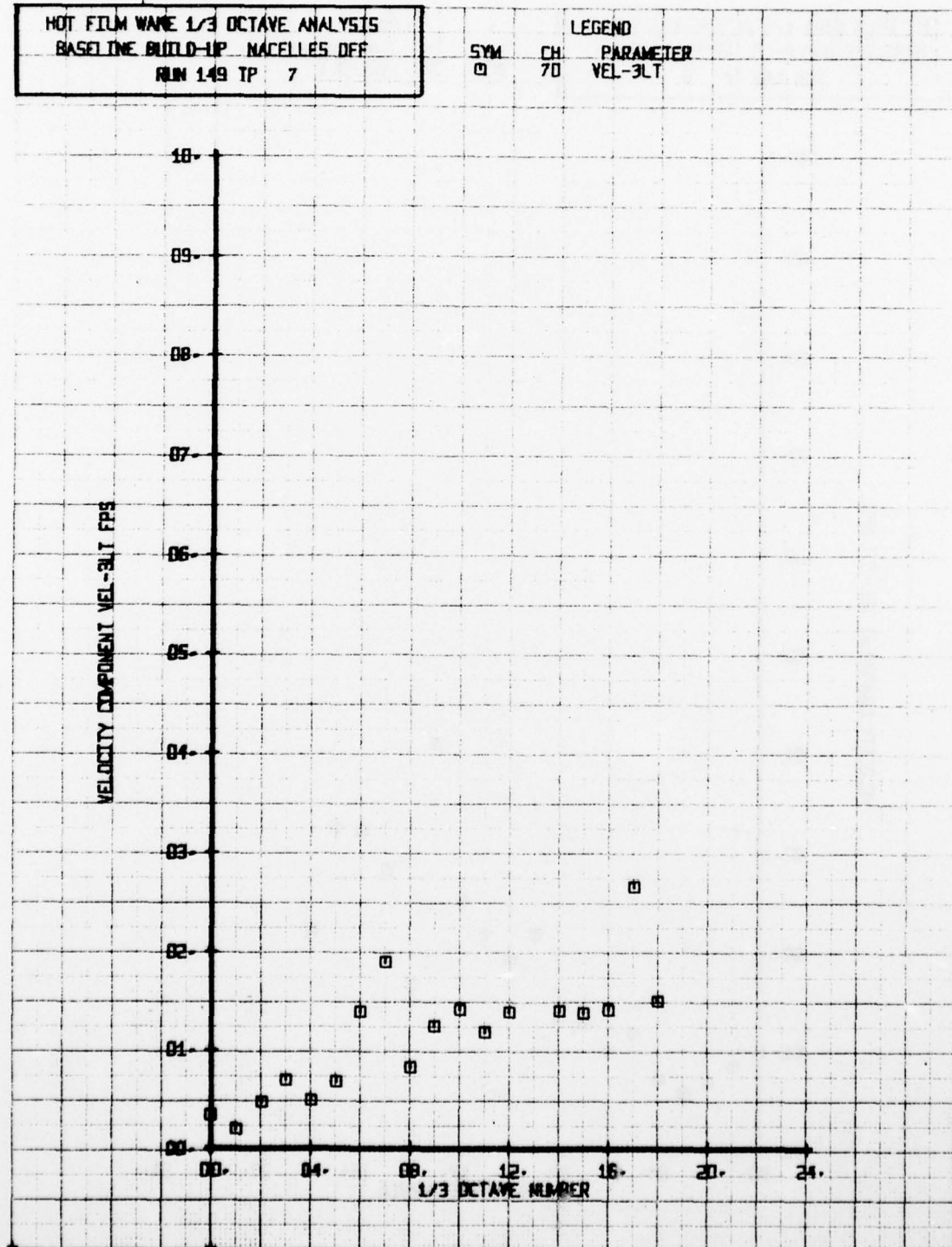
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLE 85 DFF  
 RUN 149 TP 6

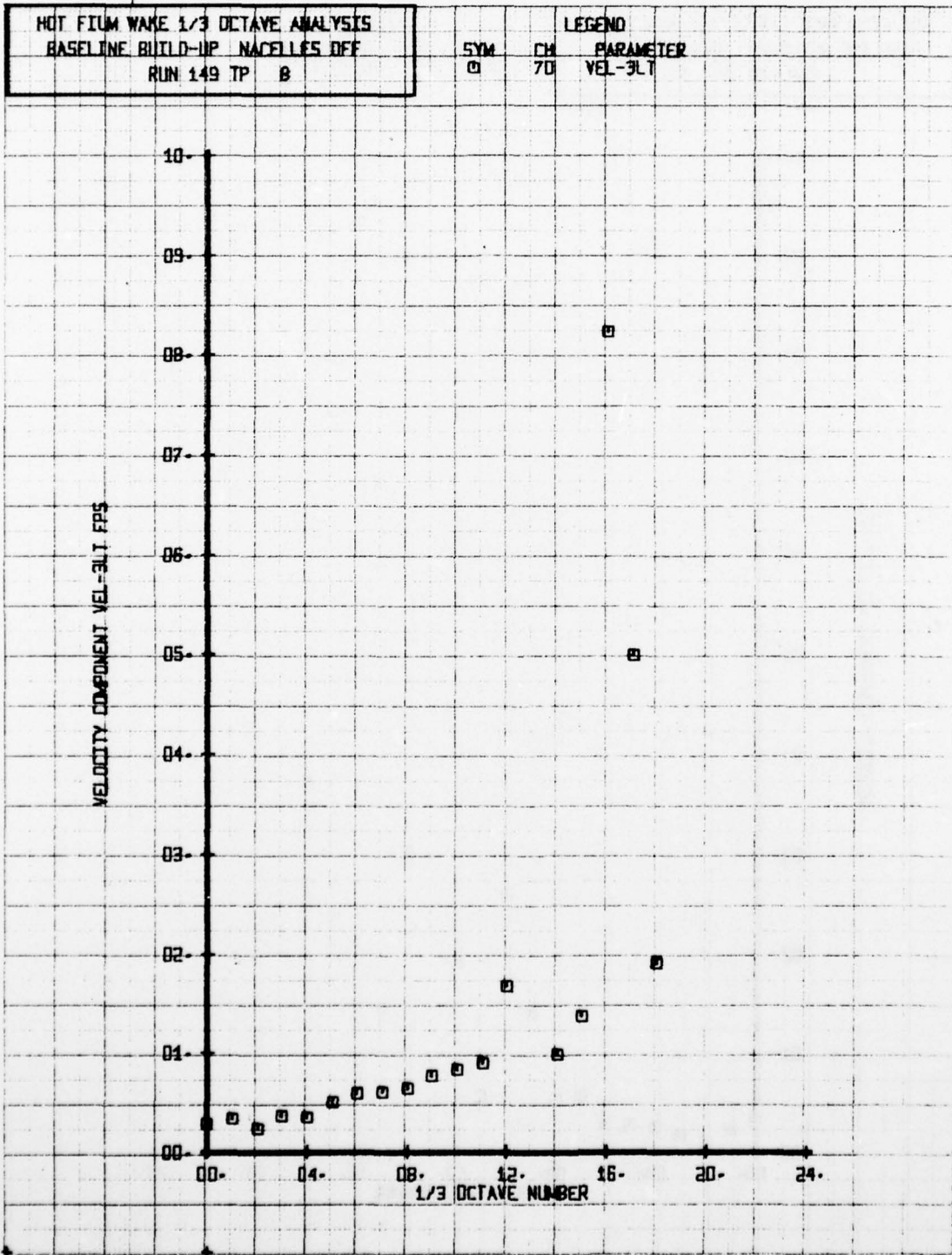
SYM	CH	LEGEND
0	70	PARAMETER VEL-3LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP MACELLES OFF  
 RUN 149 TP 7

SYM	CH	PARAMETER
□	70	VEL-3LT





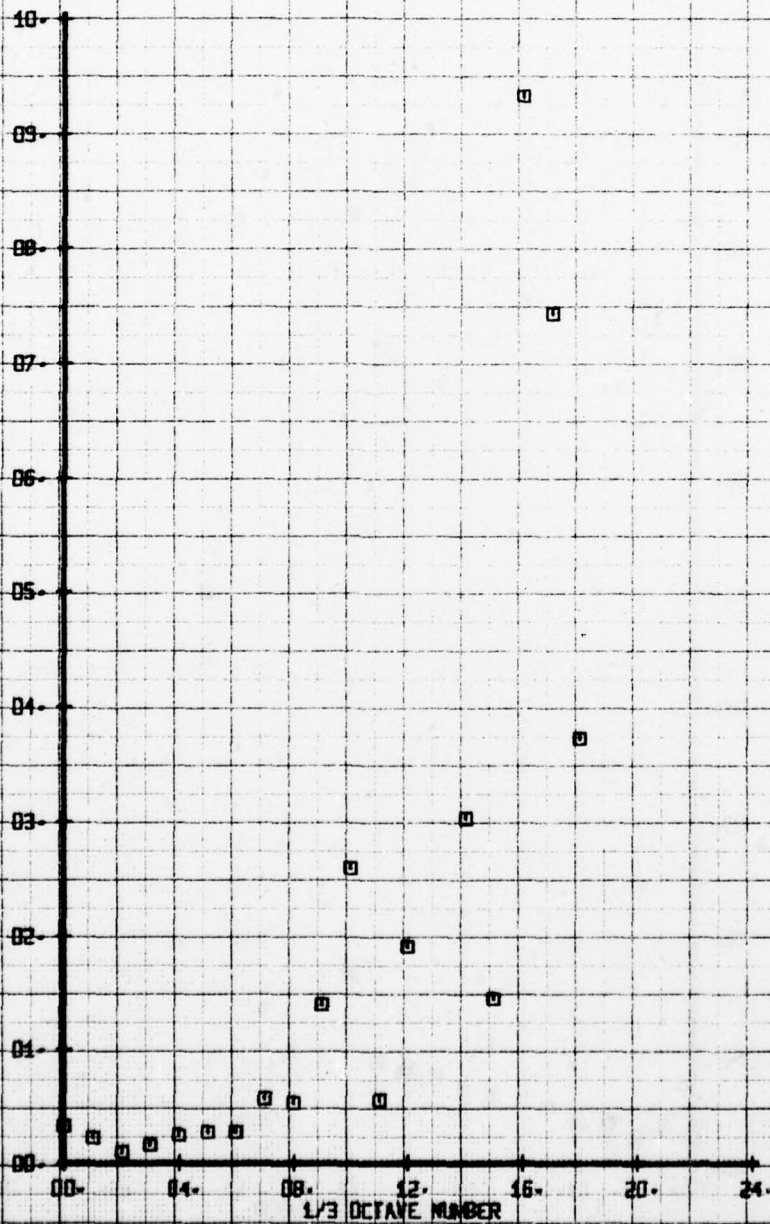
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 9

SYM  
 □

CH  
 70

LEGEND  
 PARAMETER  
 VEL-3LT

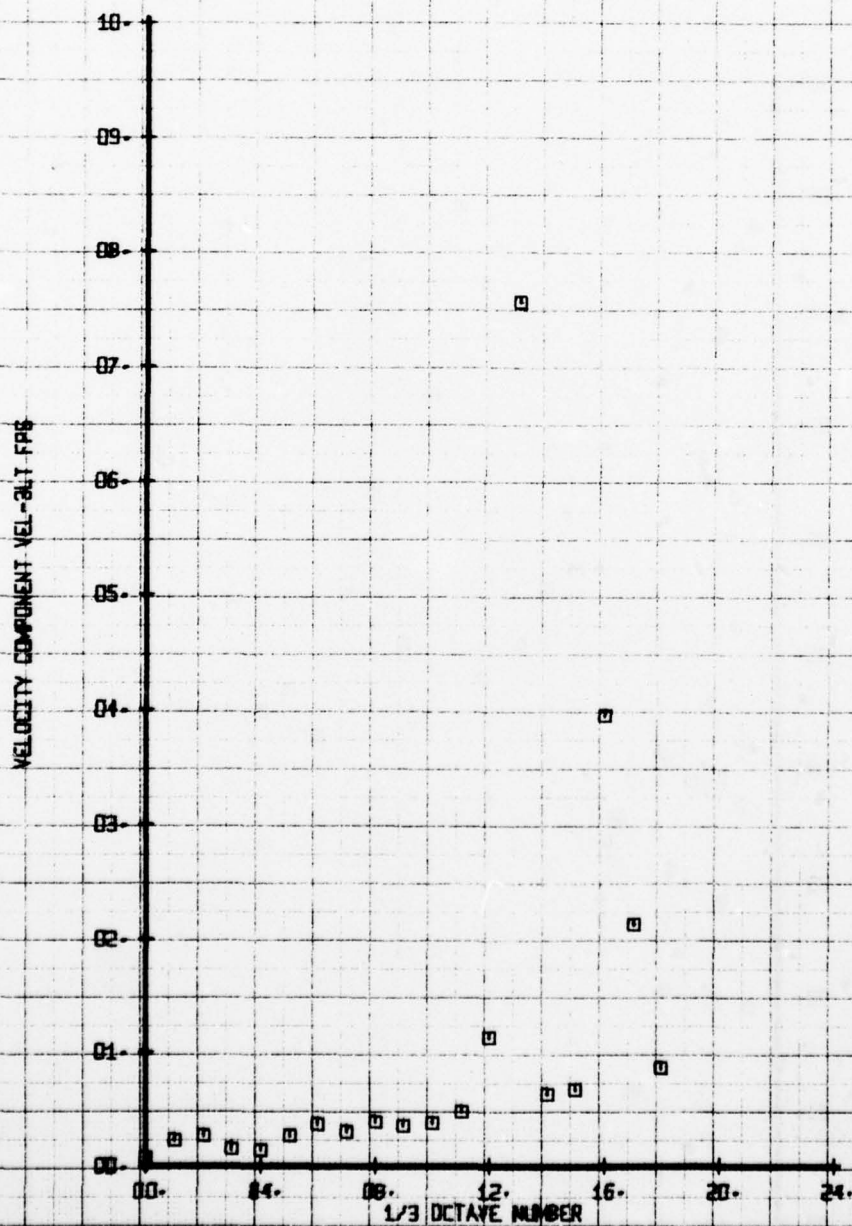
VELOCITY COMPONENT VEL-3LT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE BUILD-UP NACELLES OFF  
 RUN 149 TP 10

SYM	CH	PARAMETER
□	70	VEL-3LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASELINE REPEAT AT 60KTI

RUN 150 TP 2

SYM

□

CH

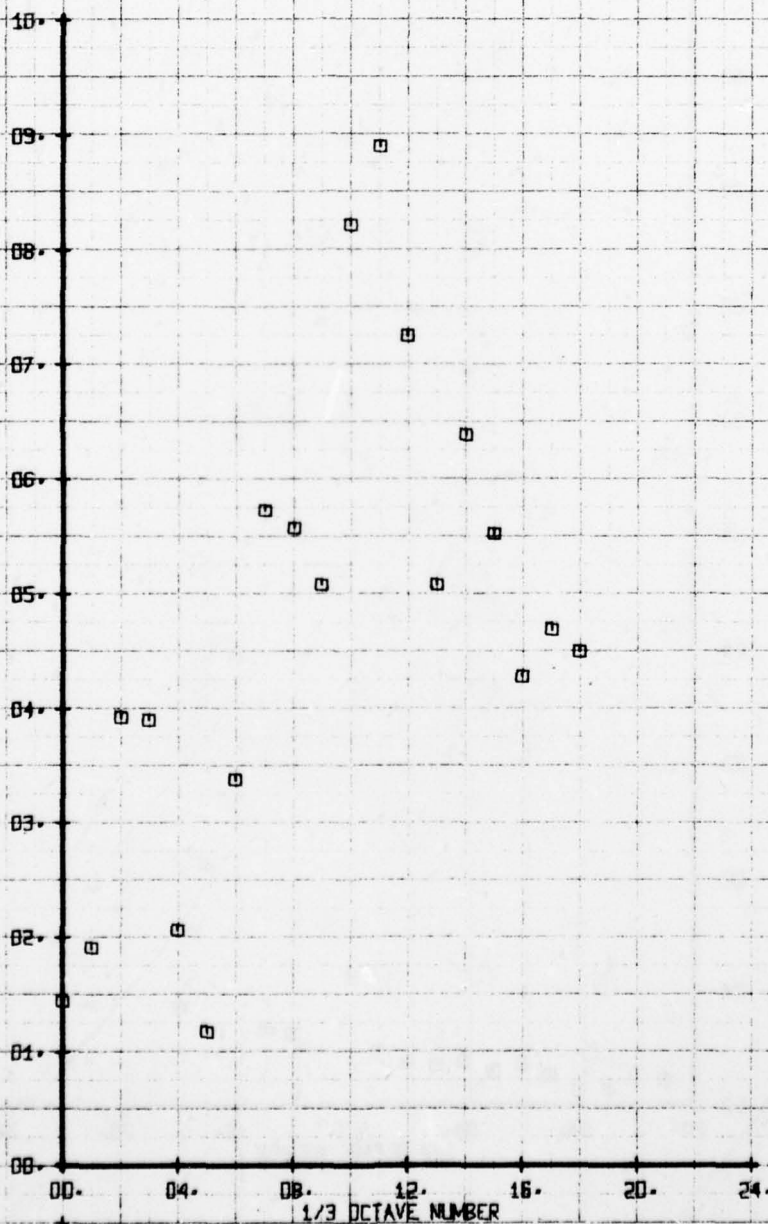
71

LEGEND

PARAMETER

VEL-3RT

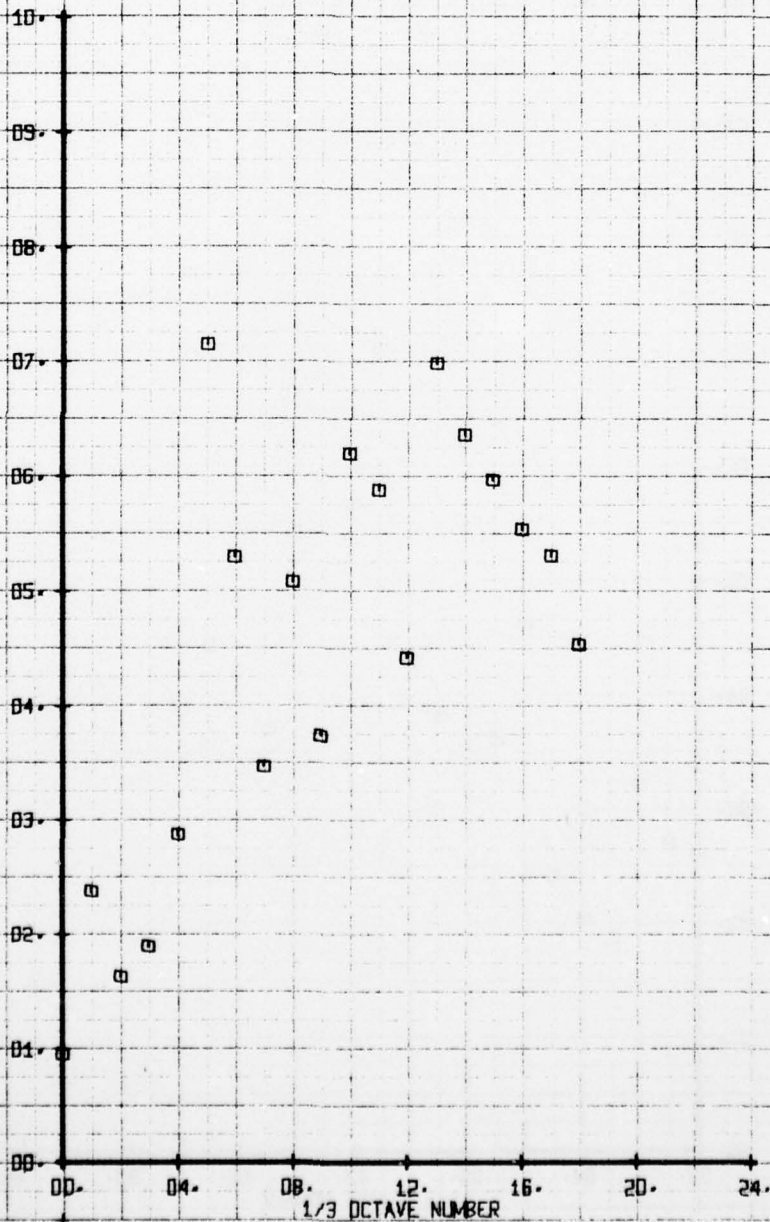
VELOCITY COMPONENT VEL-3RT FPS



HOI FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60RT  
 RUN 150 TP 3

SYM	CH	PARAMETER
□	71	VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



AD-A061 994

BOEING VERTOL CO PHILADELPHIA PA

F/6 1/3

INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONF--ETC(U)

SEP 78 P F SHERIDAN

DAAJ02-77-C-0020

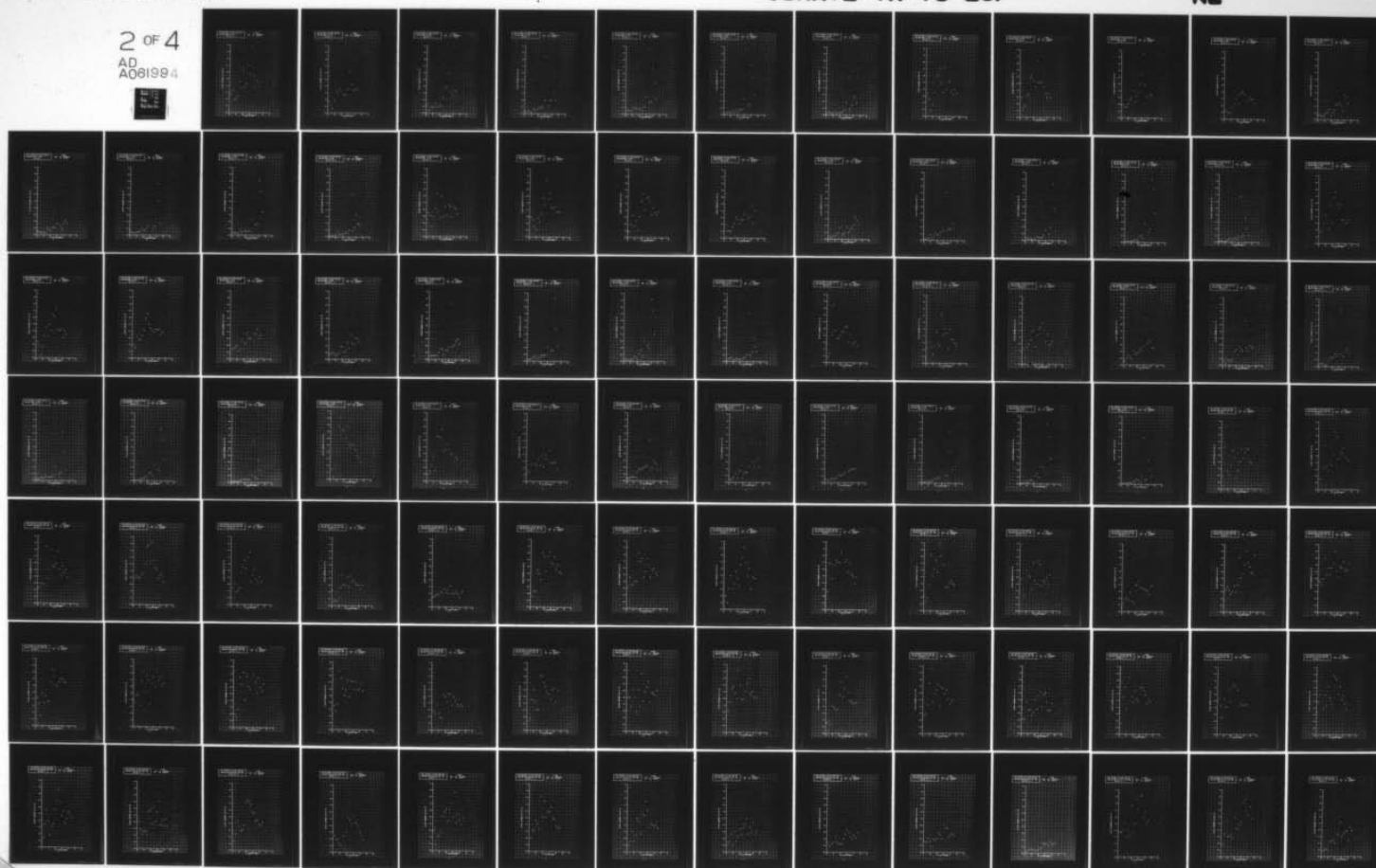
UNCLASSIFIED

USARTL-TR-78-23F

NL

2 OF 4

AD  
A061994





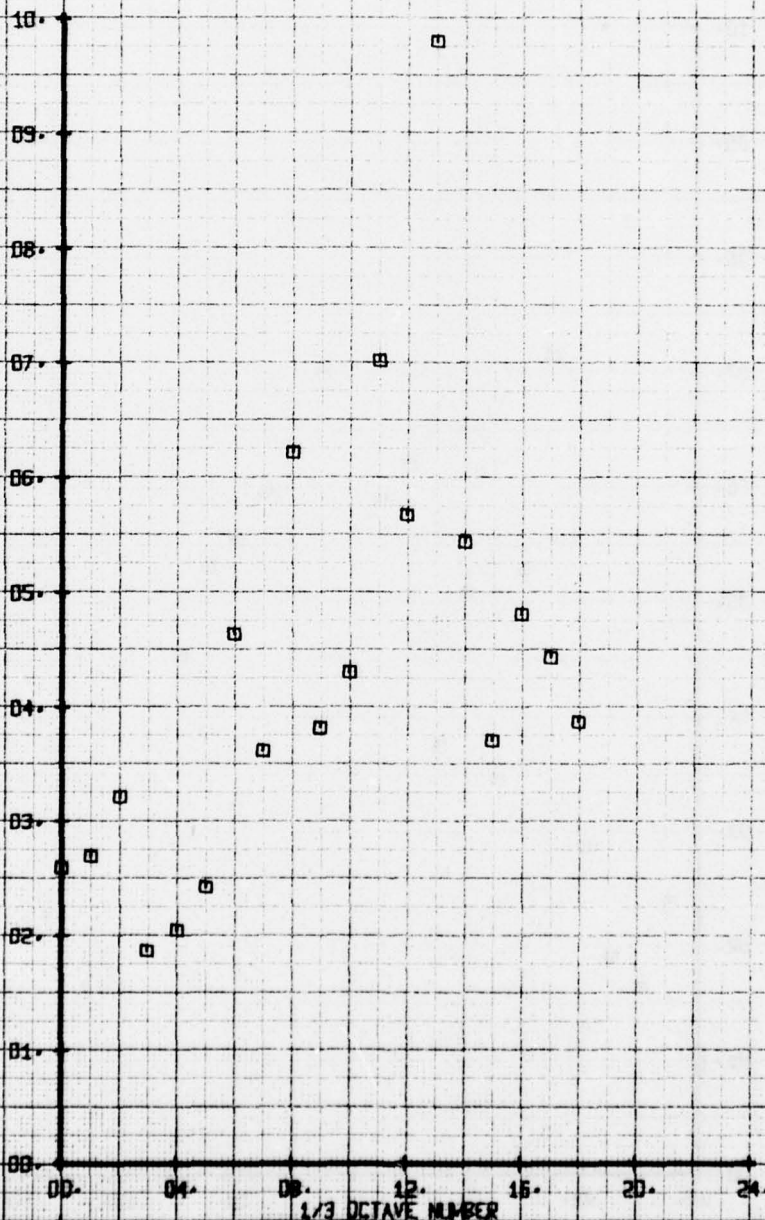
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60MT  
RUN 150 TP 4

SYM  
□

CH  
71

LEGEND  
PARAMETER  
VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



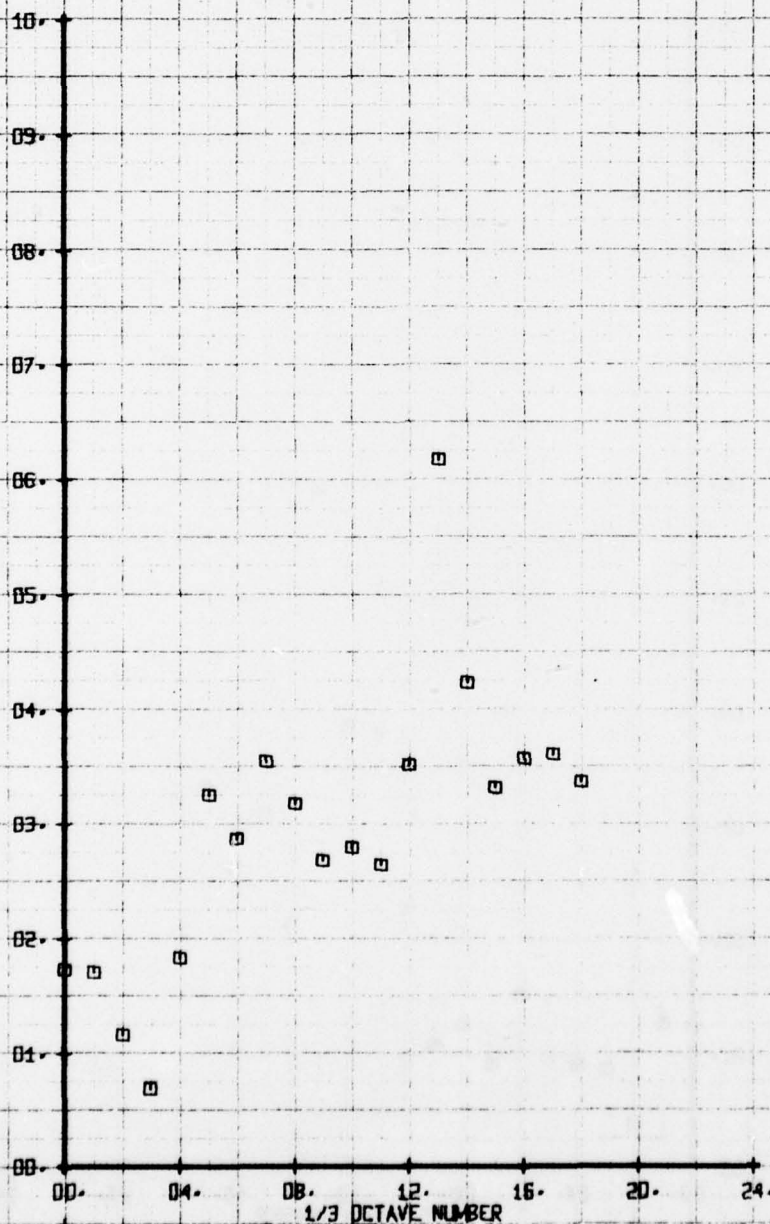
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60RT  
RUN 150 TP 5

SYM  
□

CH  
71

LEGEND  
PARAMETER  
VEL-3RT

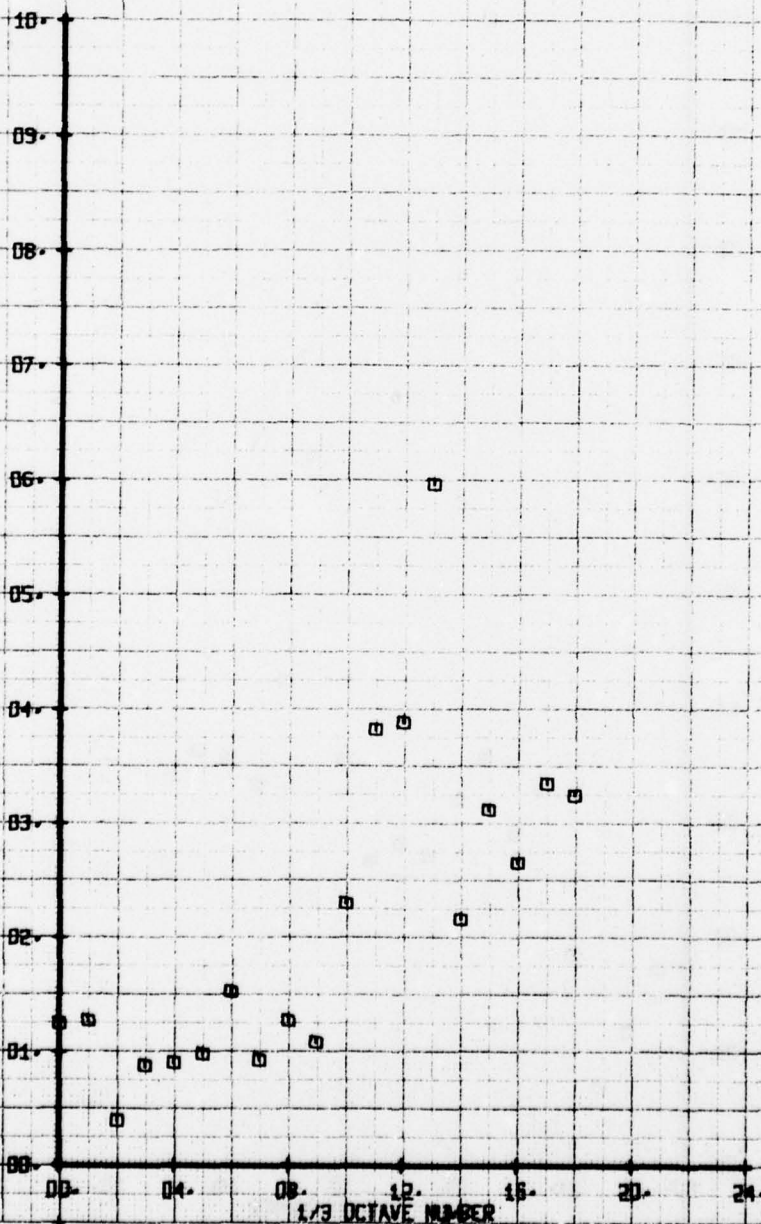
VELOCITY COMPONENT VEL-3RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60RT  
 RUN 150 TP 6

SYM	CH	PARAMETER
□	71	VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASLINE REPEAT AT 60MT

RUN 150 TP 7

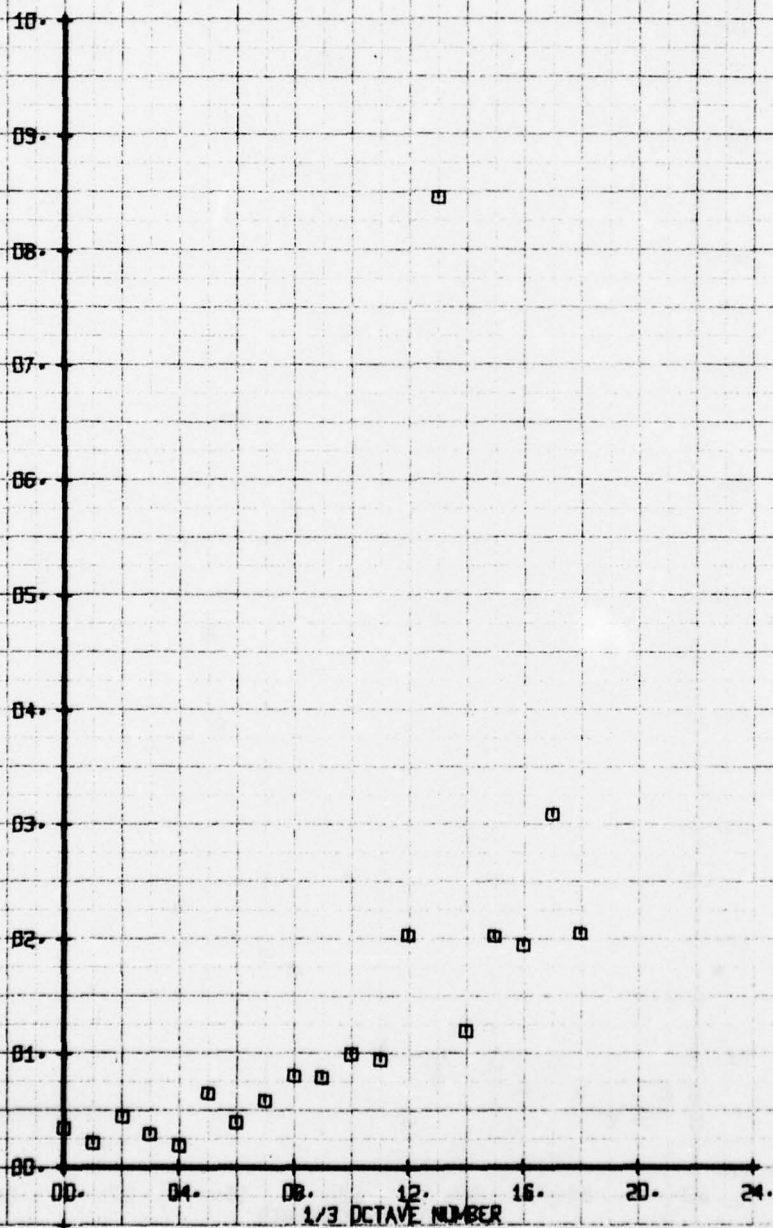
SYM  
□

CH  
71

LEGEND

PARAMETER  
VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS

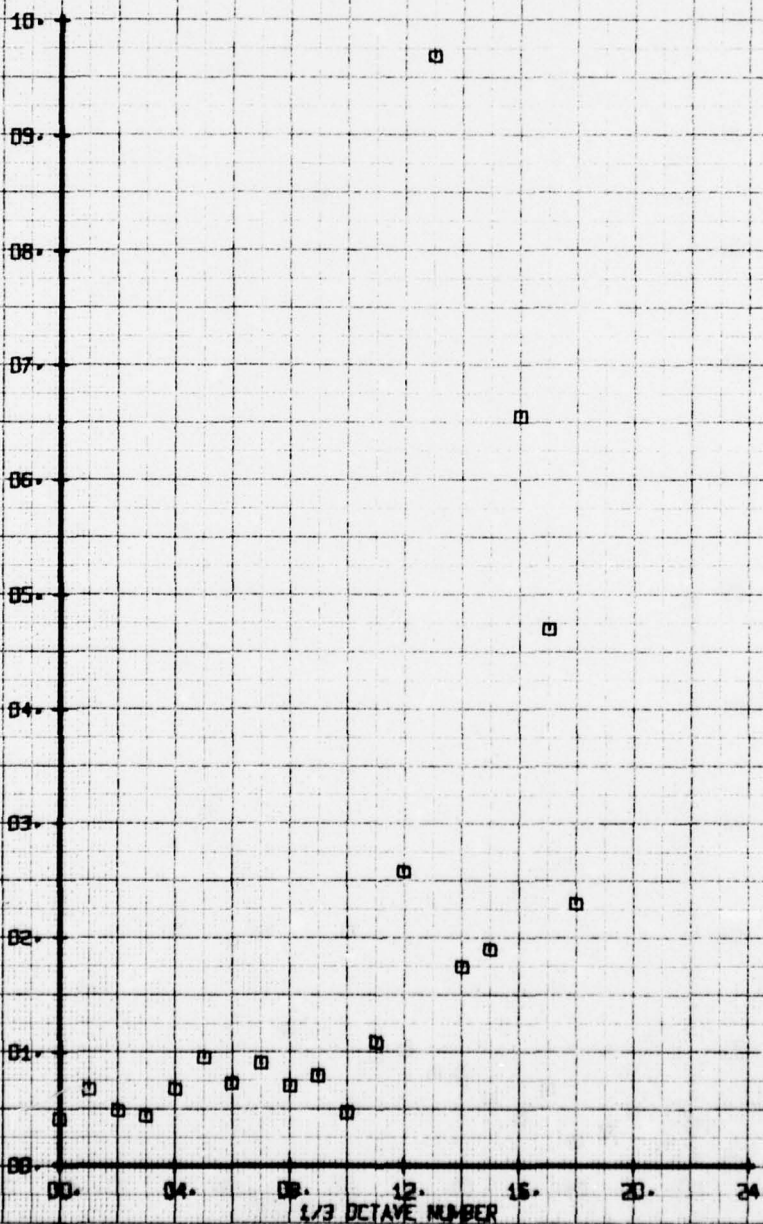




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 8

SYM	CH	PARAMETER
□	71	VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



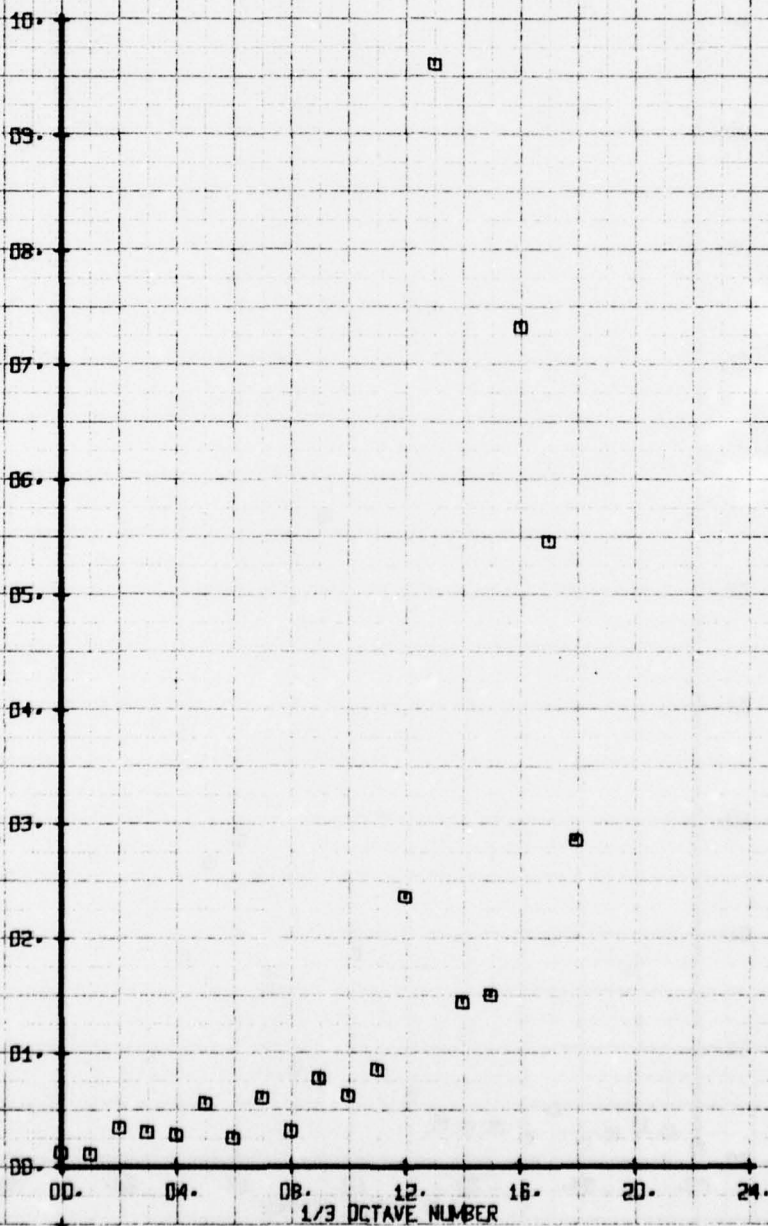
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60RT  
 RUN 150 TP 9

SYM  
 □

CH  
 71

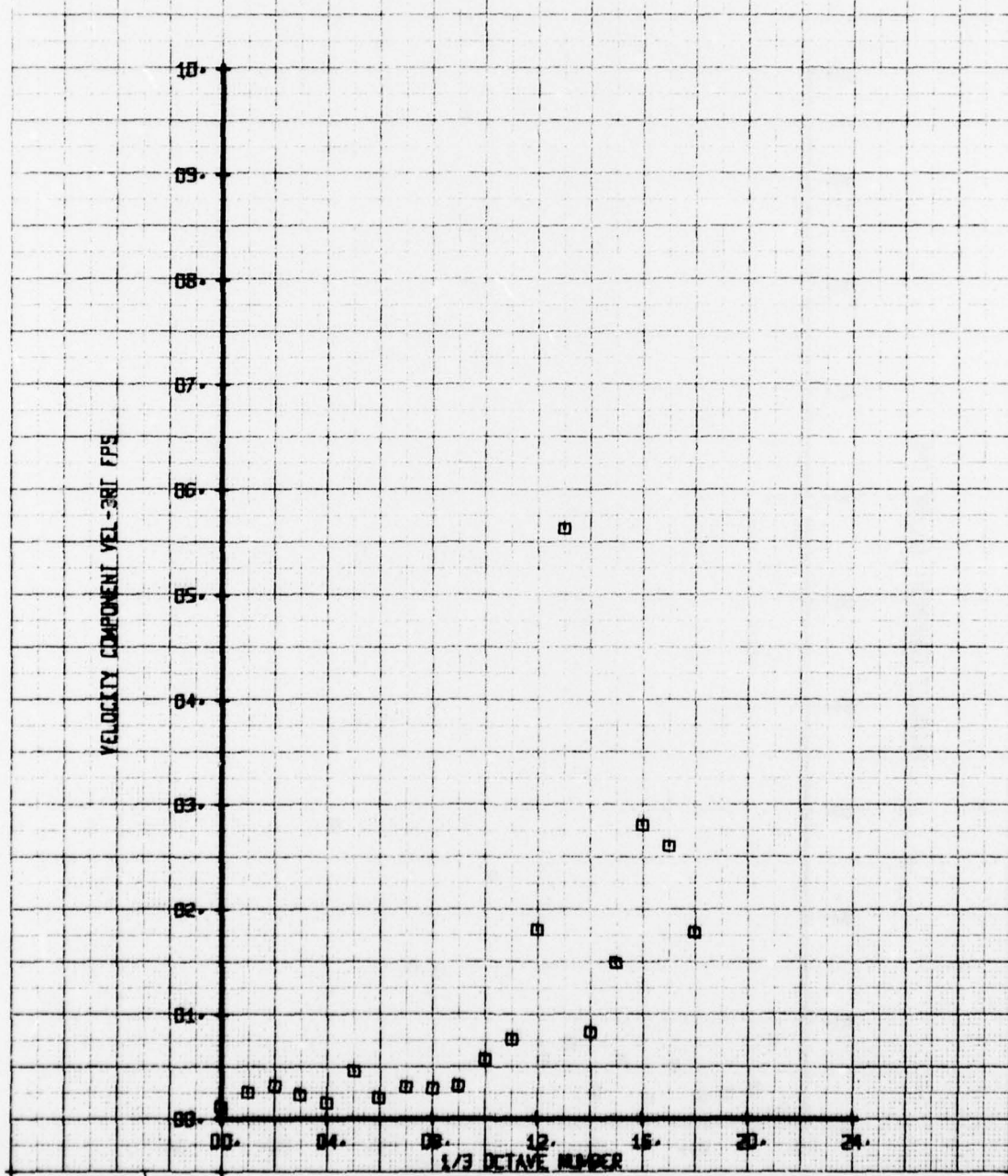
LEGEND  
 PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



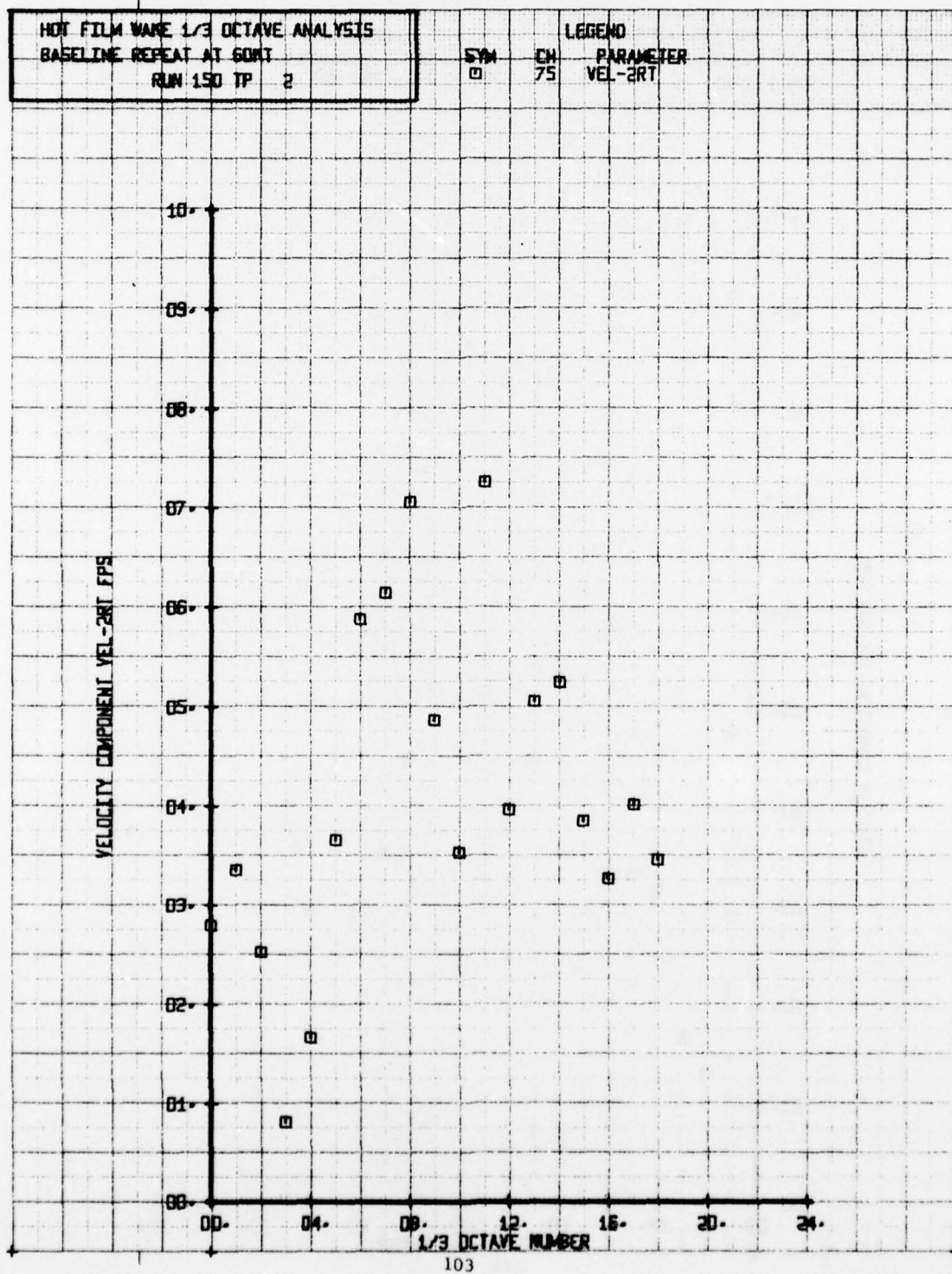
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 10

SYM	CH	PARAMETER
□	71	VEL-3RT



HOT FILM WARE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60MT  
RUN 150 TP 2

SYN CH PARAMETER  
□ 75 VEL-2RT





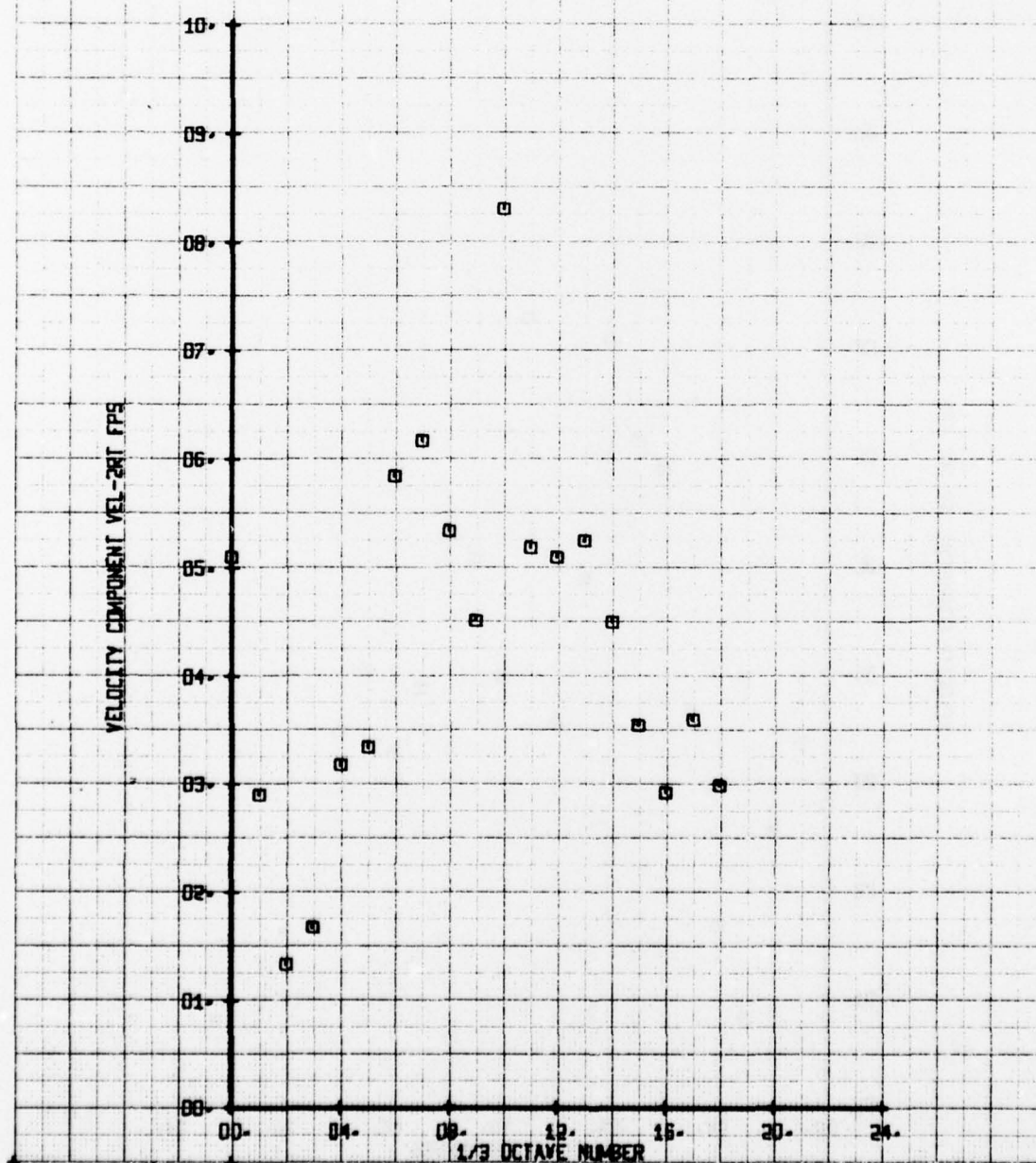
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60RT  
 RUN 1SD TP 3

SYM  
 □

CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS

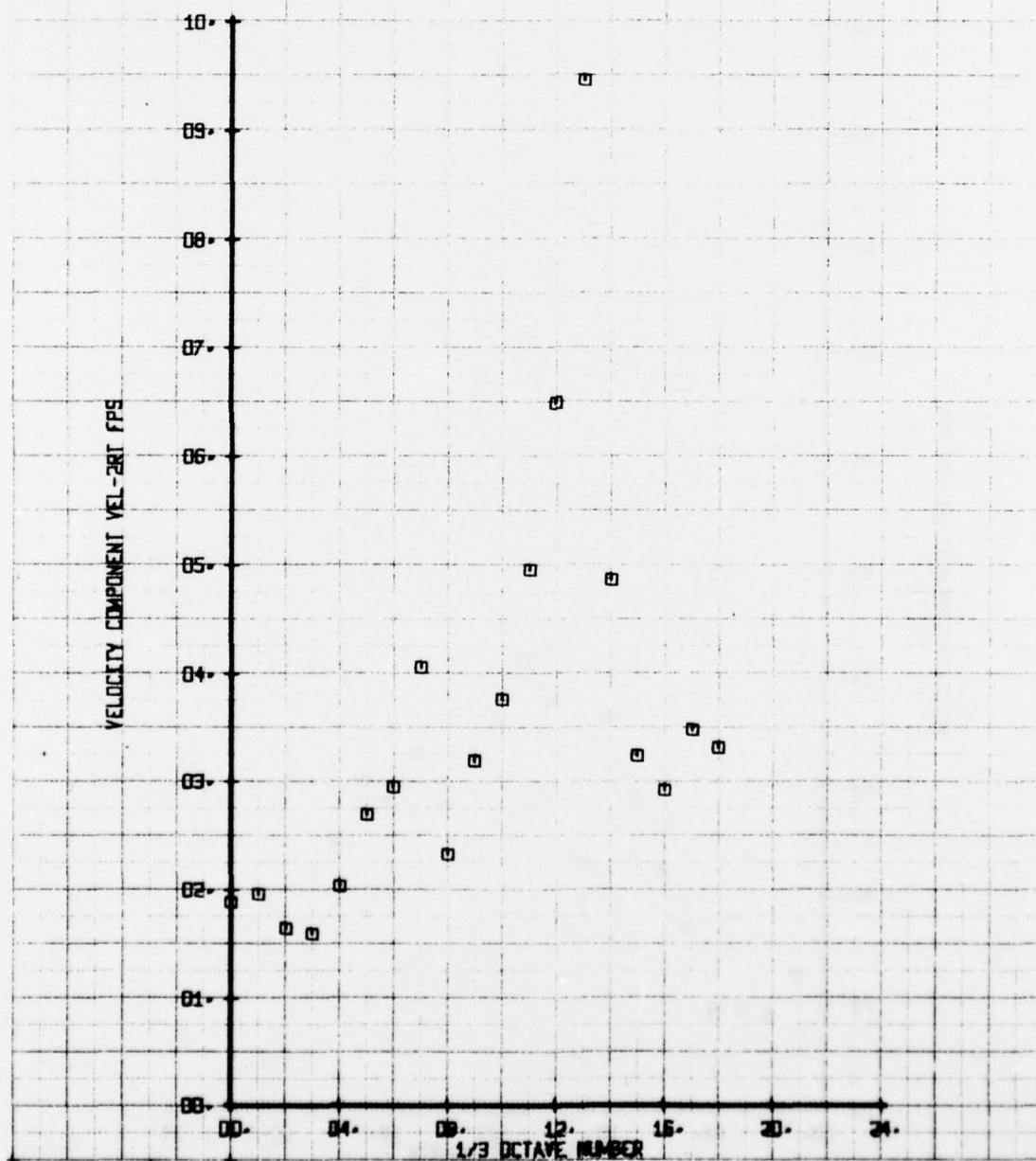


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60MT  
RUN 150 TP 4

SYM  
□

CH  
75

LEGEND  
PARAMETER  
VEL-2RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASELINE REPEAT AT 60KT

RUN 150 TP 5

SYM

□

CH

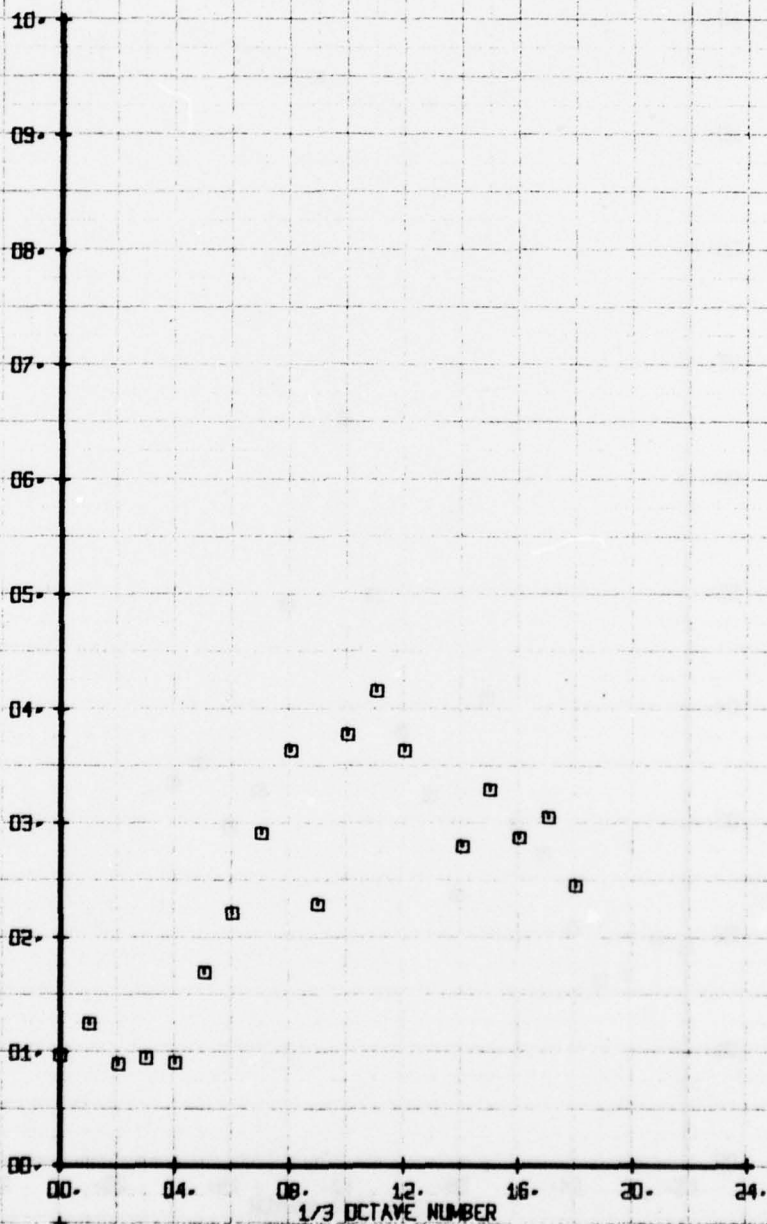
75

LEGEND

PARAMETER

VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS



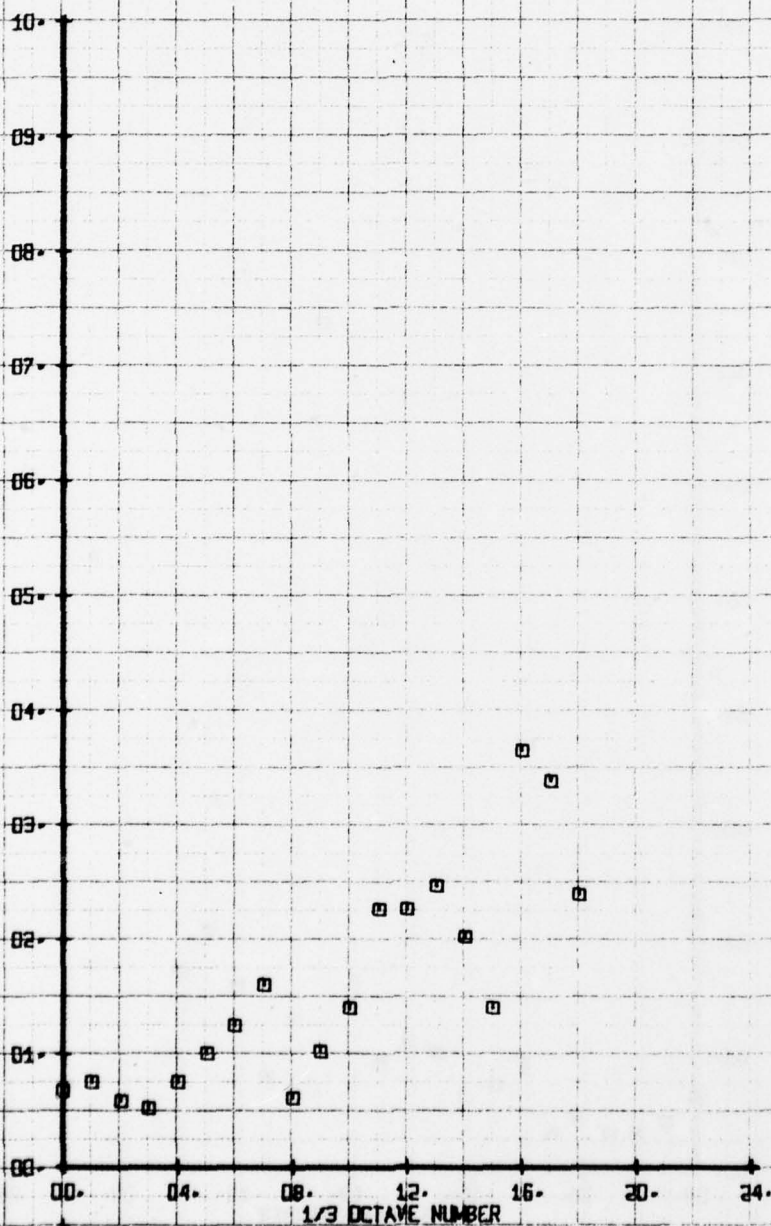
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60KT  
RUN 150 TP 6

SYM  
□

CH  
75

LEGEND  
PARAMETER  
VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS

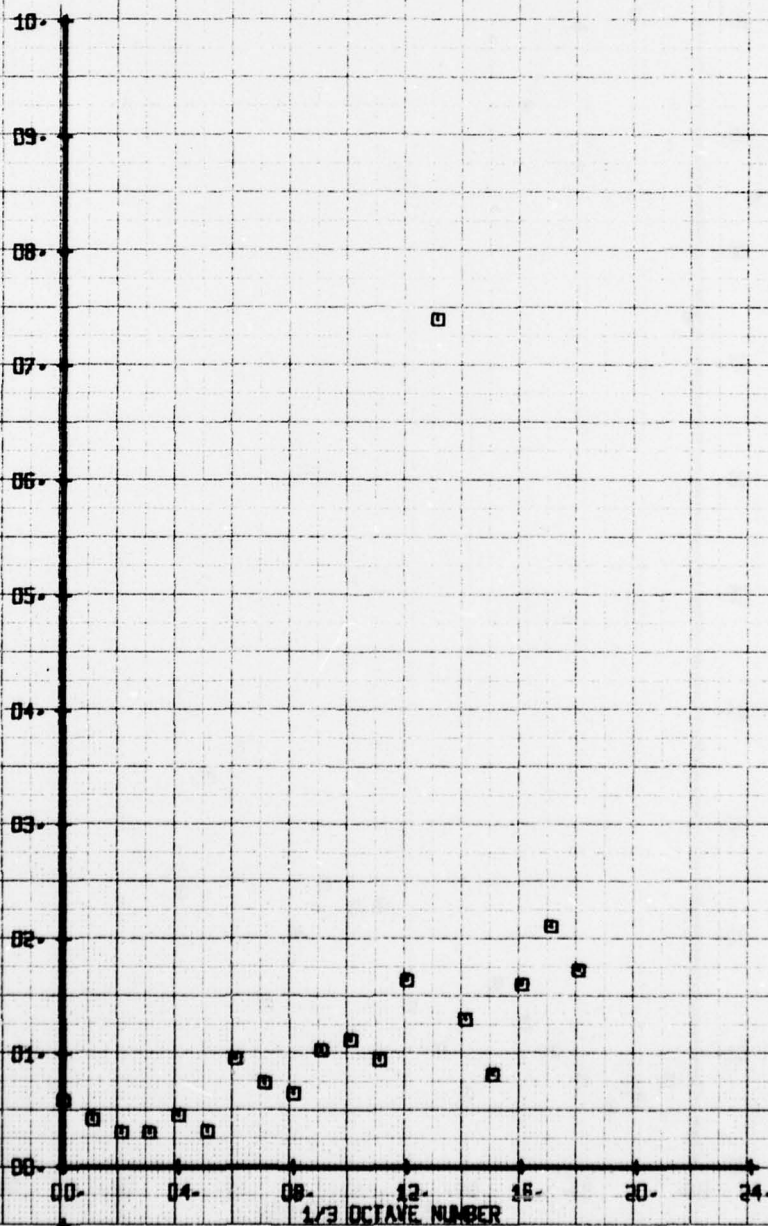




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60Kt  
 RUN 150 TP 7

LEGEND  
 CH 75 VEL-2RT  
 □

VELOCITY COMPONENT VEL-2RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASELINE REPEAT AT 60KTI

RUN 150 TP 8

SYM

□

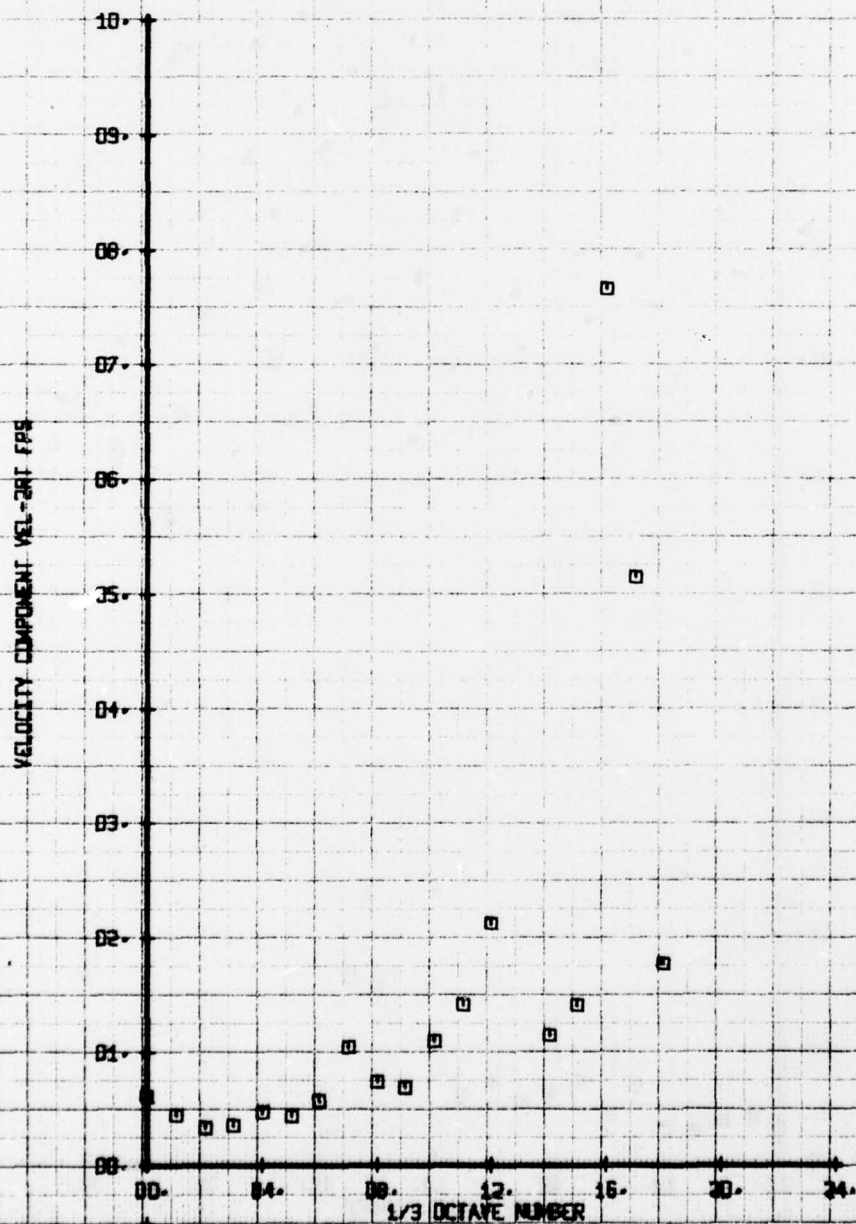
CH

75

LEGEND

PARAMETER

VEL-2RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

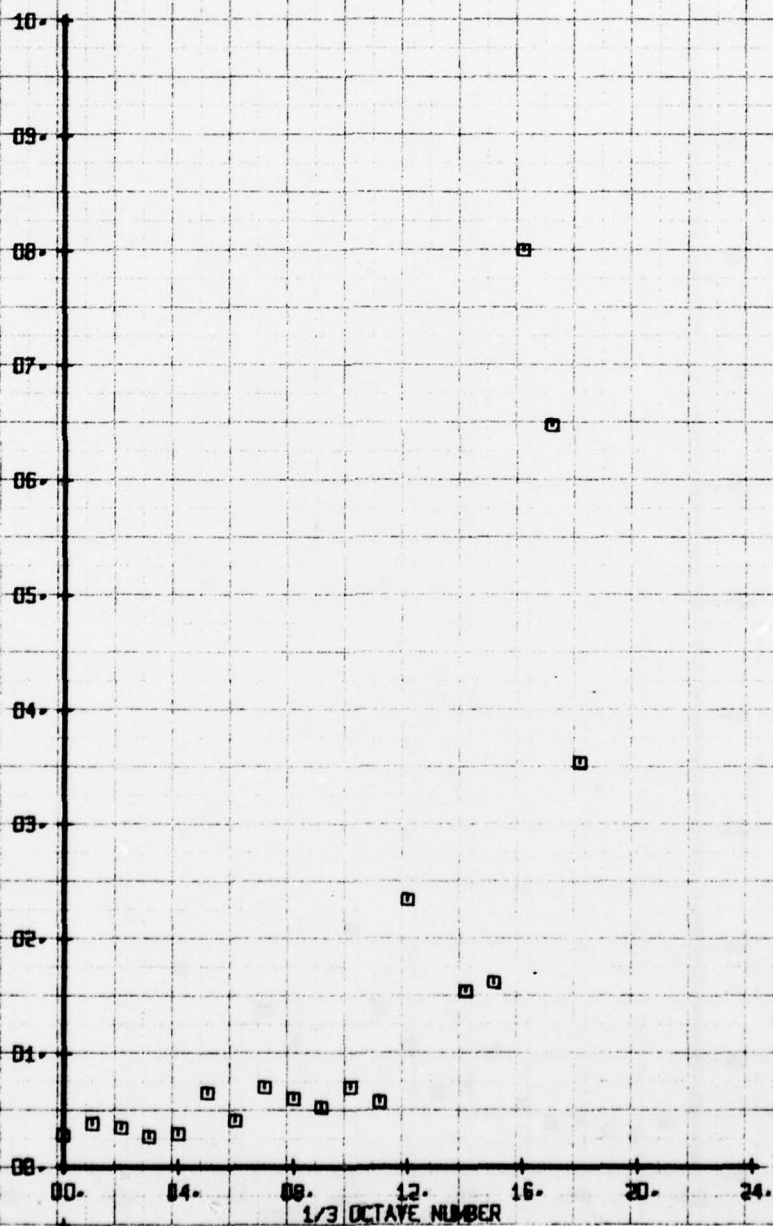
BASELINE REPEAT AT 60KT

RUN 150 TP 9

LEGEND

SYM	CH	PARAMETER
□	75	VEL-2RT

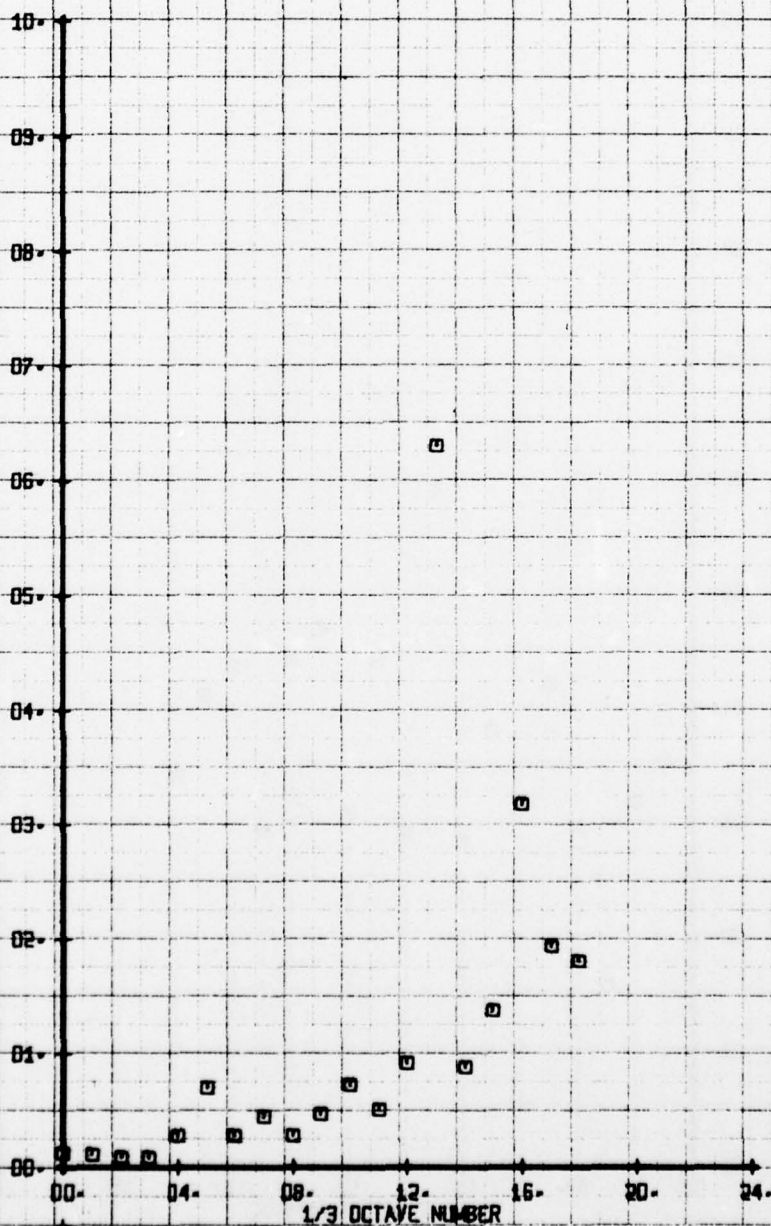
VELOCITY COMPONENT VEL-2RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60KT  
 RUN 150 TP 10

LEGEND  
 CH 75  
 VEL-2RT

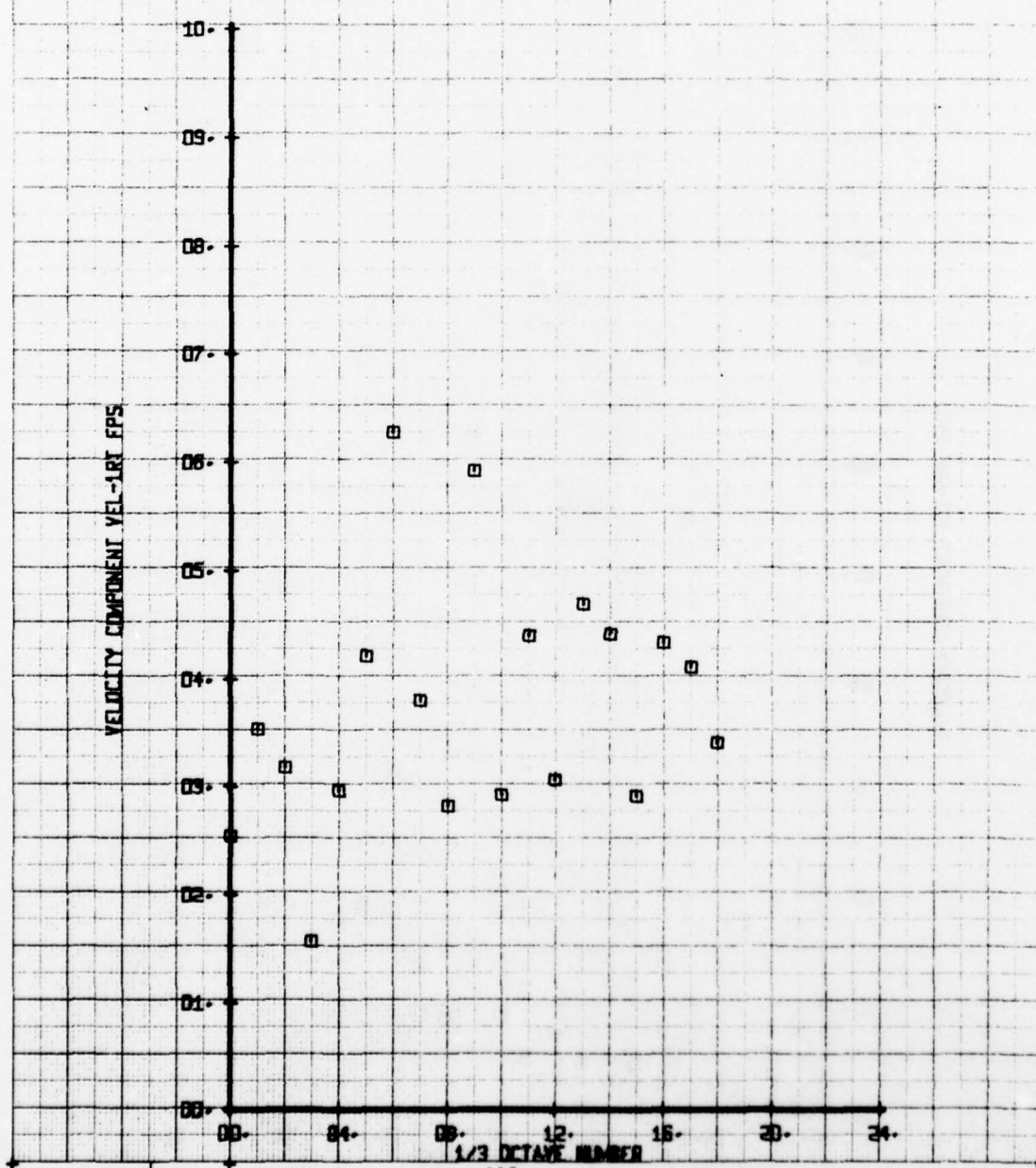
VELOCITY COMPONENT VEL-2RT FPS





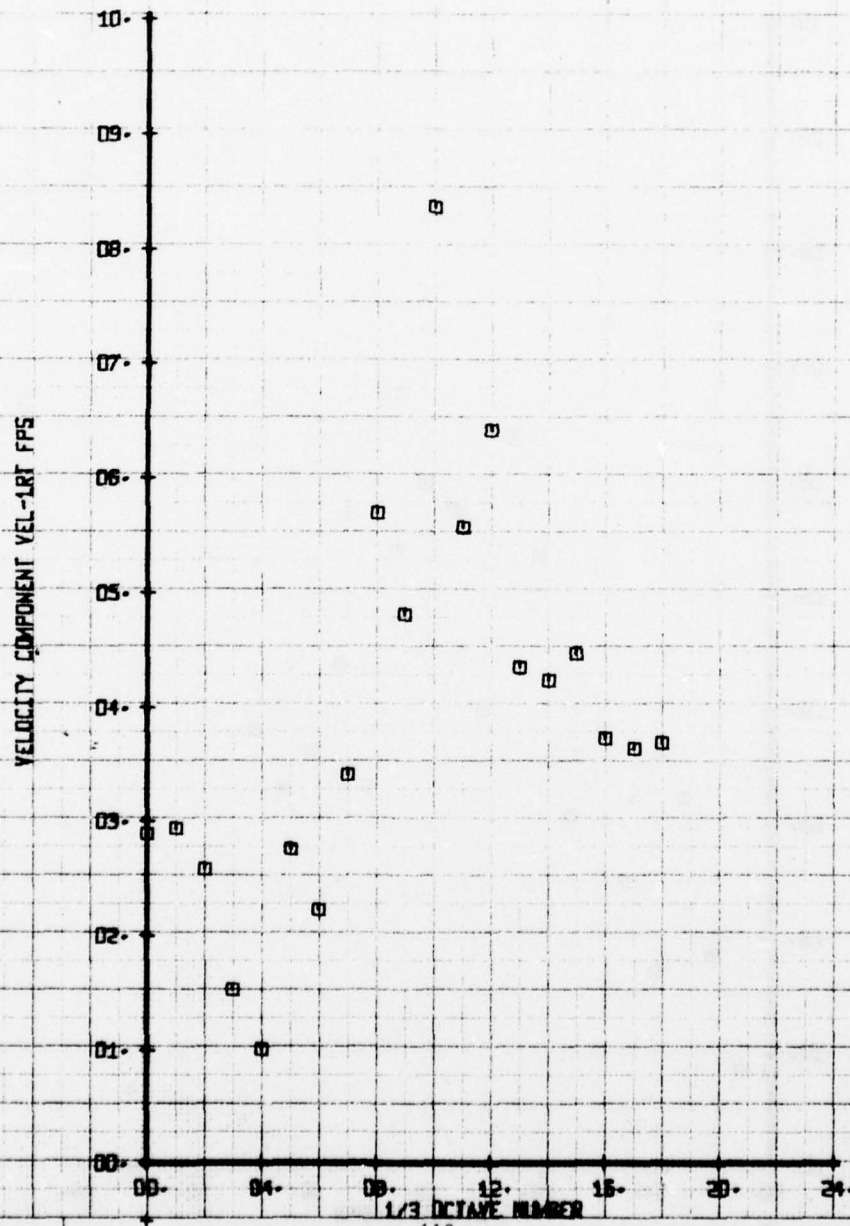
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 2

SYM CH PARAMETER  
 □ 74 VEL-1RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 3

LEGEND  
 CH 74  
 PARAMETER  
 VEL-1RT



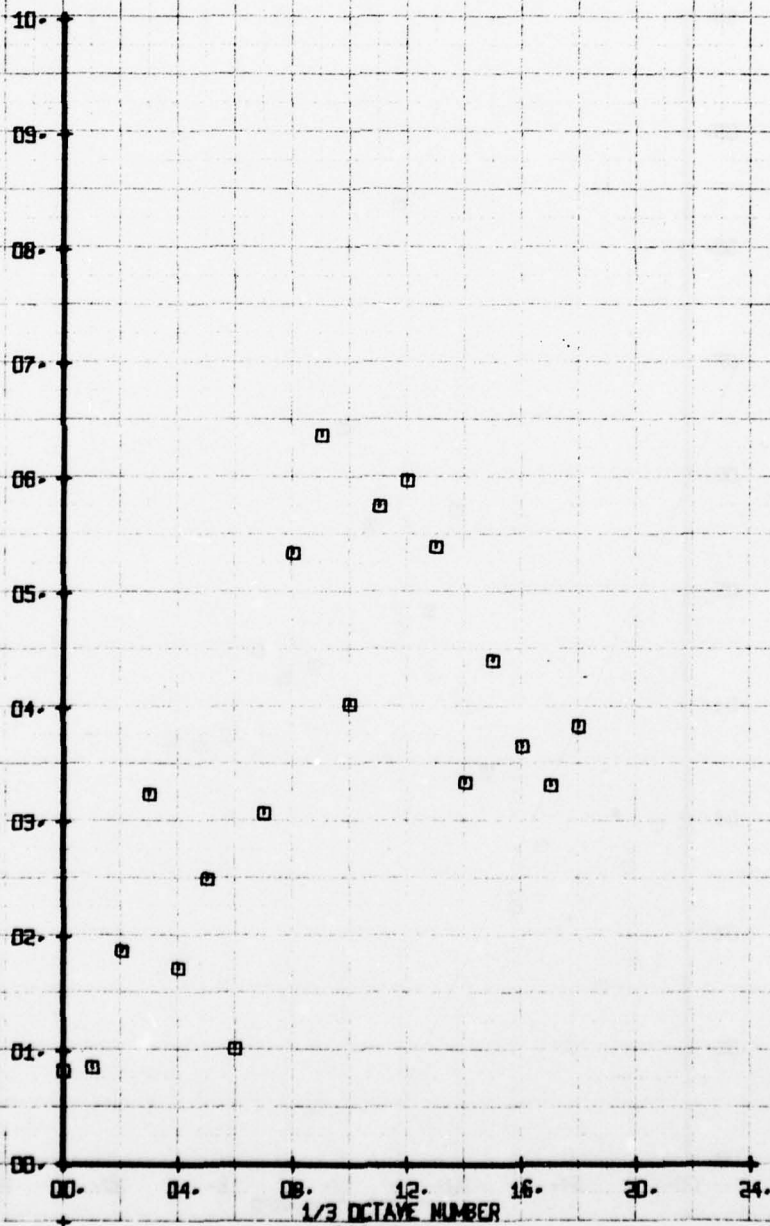
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60MT  
RUN 150 TP 4

SYM  
□

CH  
74

LEGEND  
PARAMETER  
VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS

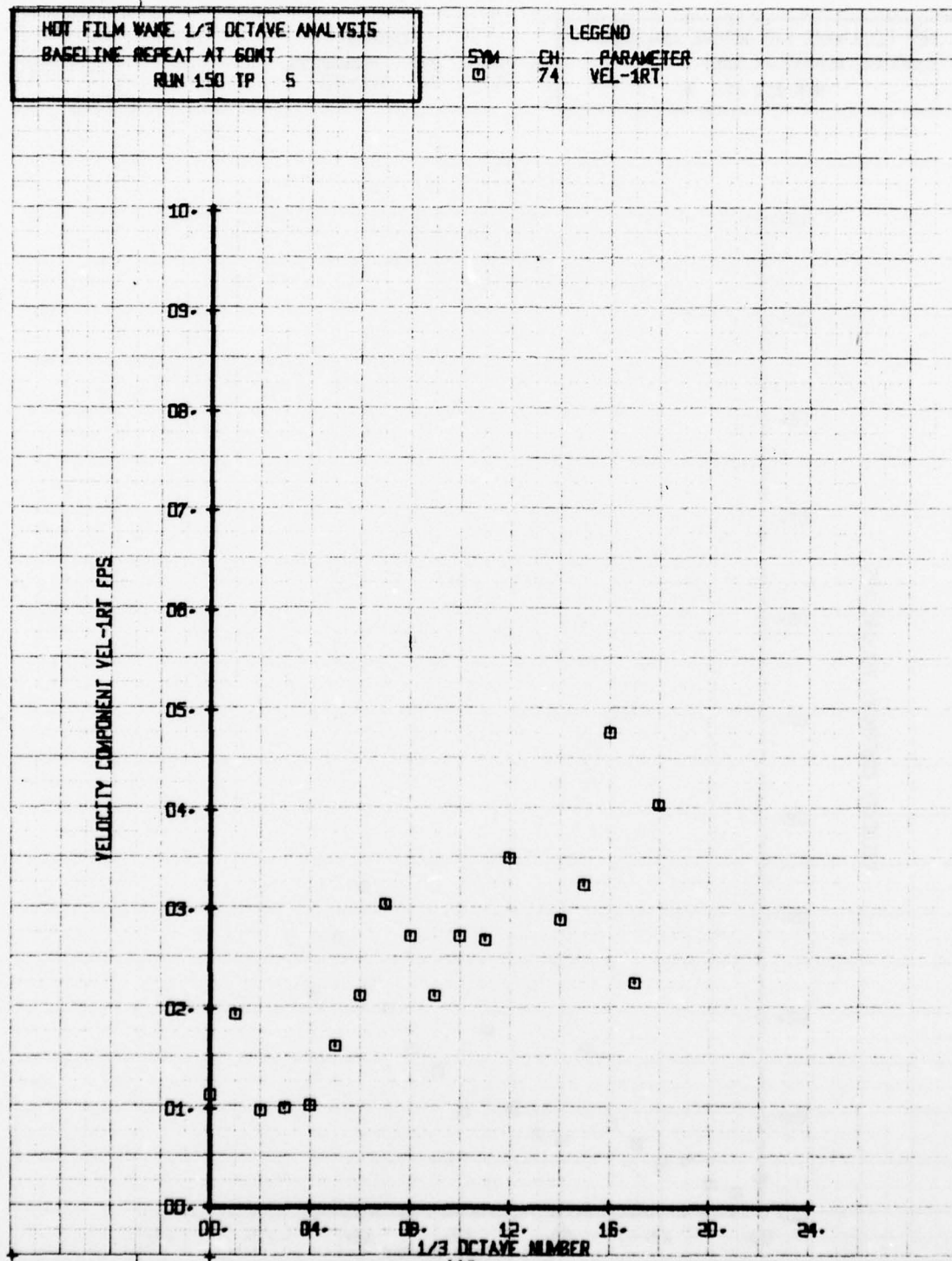


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60MT  
RUN 150 TP 5

SYM  
□

CH  
74

LEGEND  
PARAMETER  
VEL-1RT





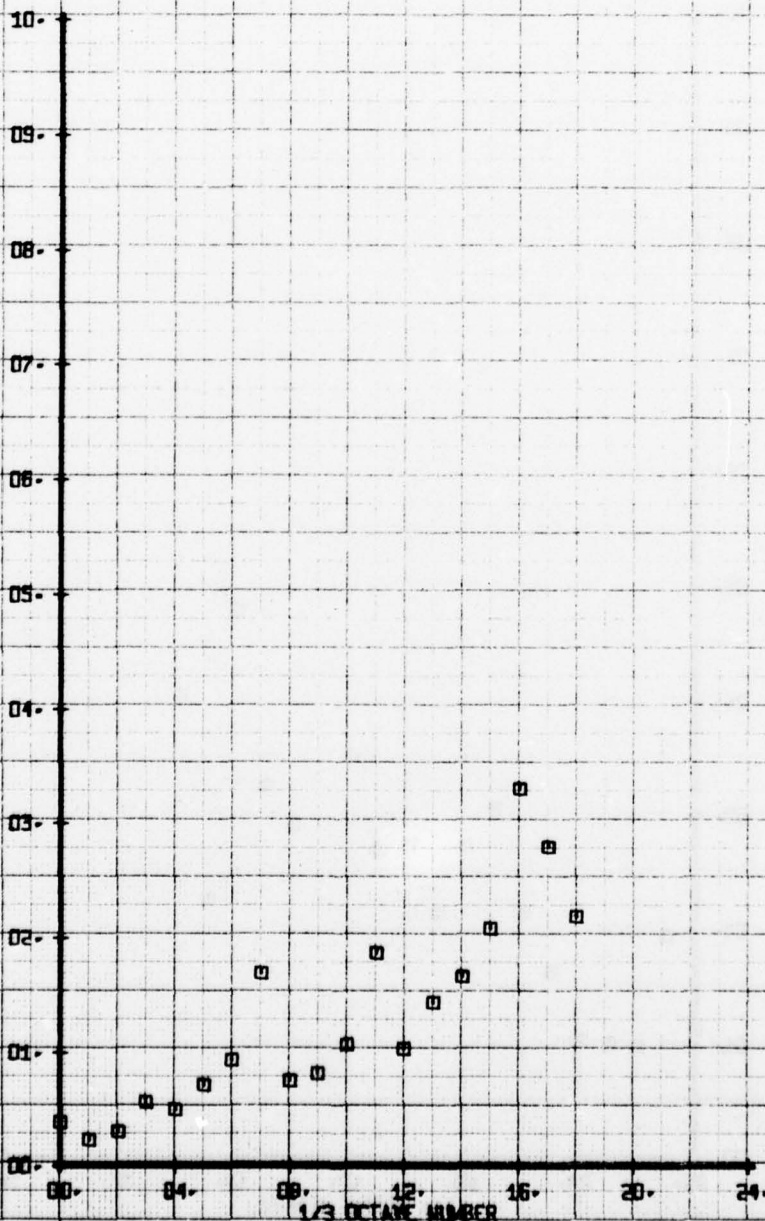
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60MT  
RUN 150 TP 6

SYM  
□

CH  
74

LEGEND  
PARAMETER  
VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS



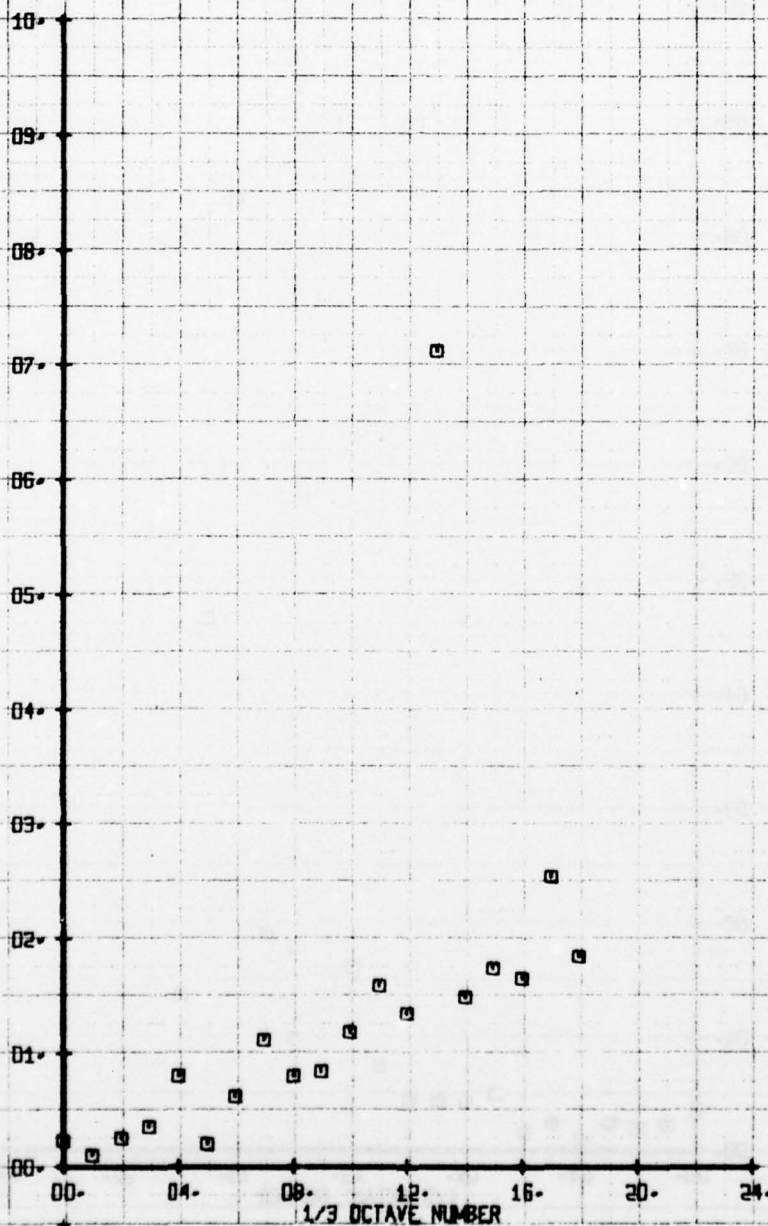
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60RT  
 RUN 150 TP 7

SYM  
 □

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

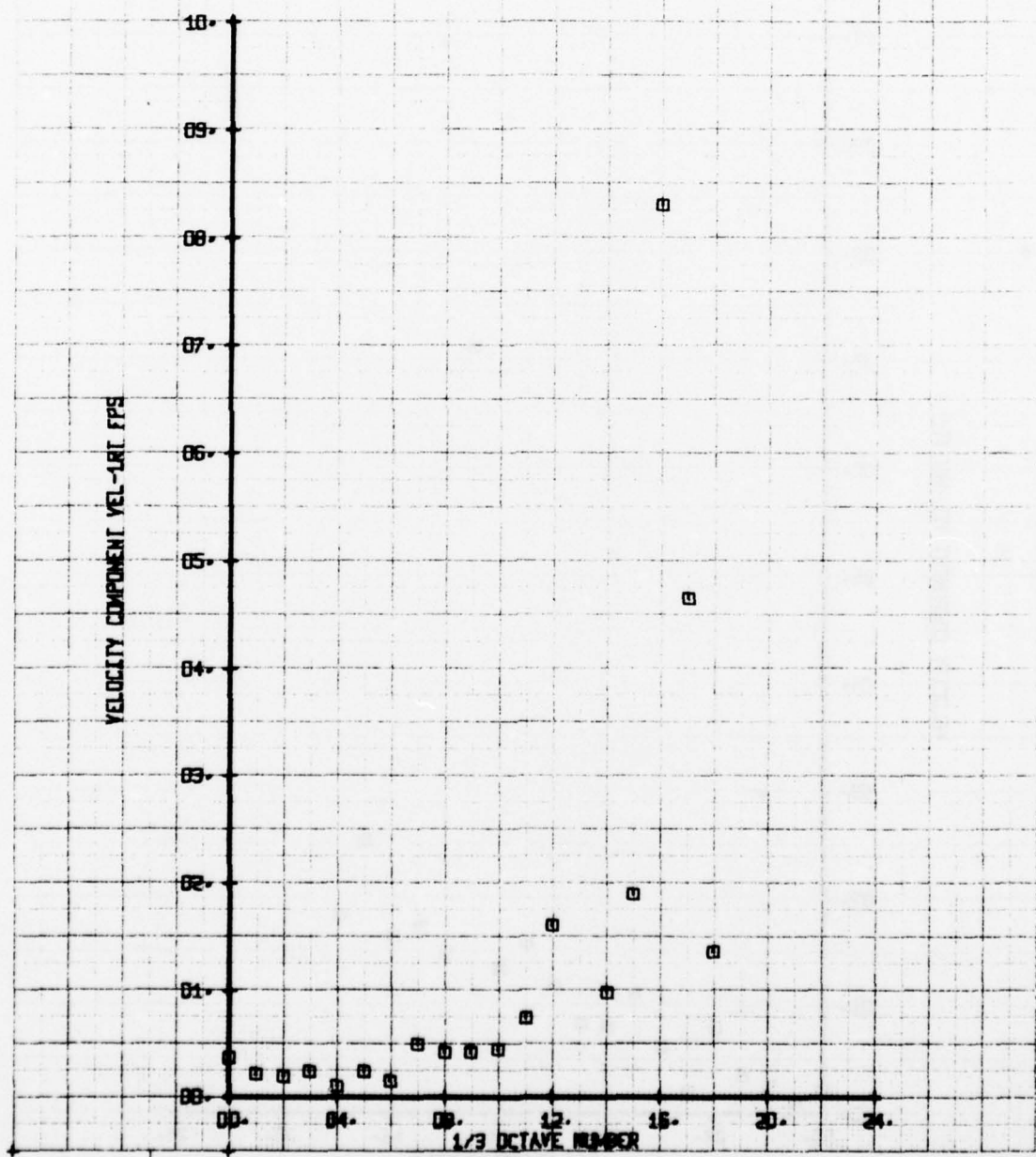
VELOCITY COMPONENT VEL-1RT FPS



1/3 OCTAVE NUMBER

HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 8

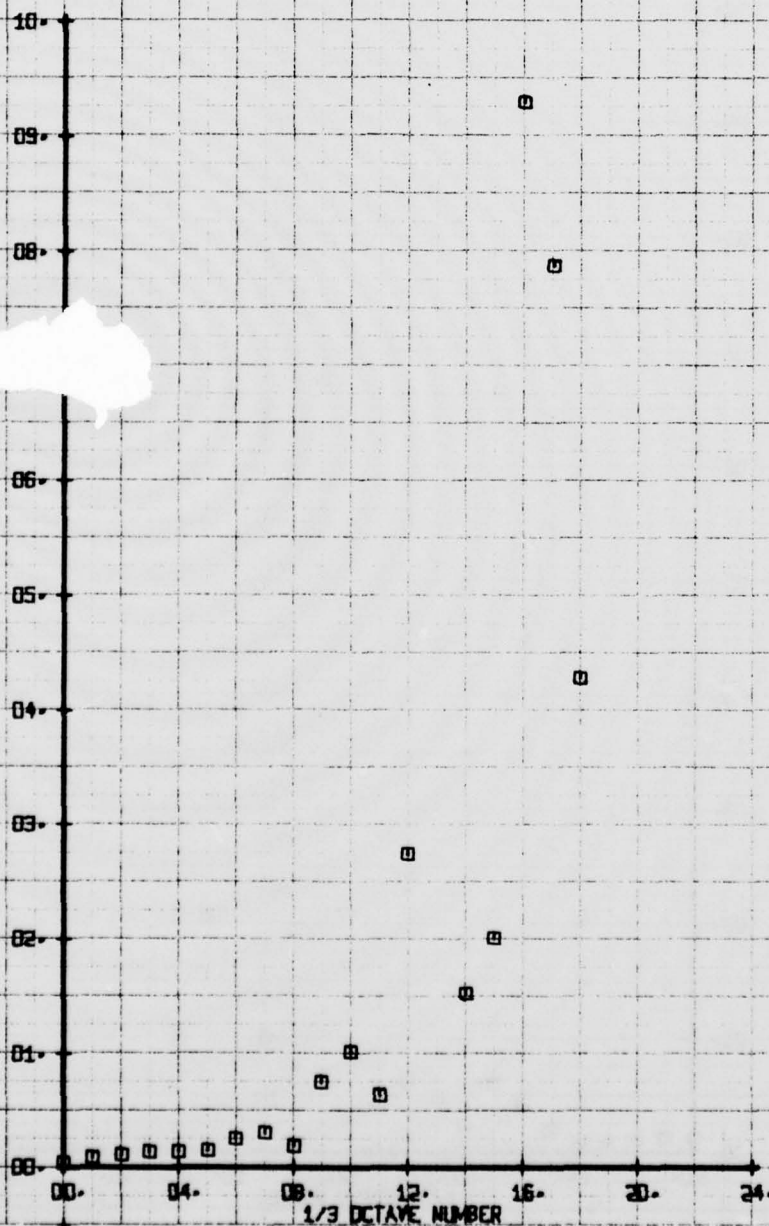
SYM	CH	PARAMETER
□	74	VEL-1RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 9

SYM	CH	LEGEND	PARAMETER
□	74		VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS

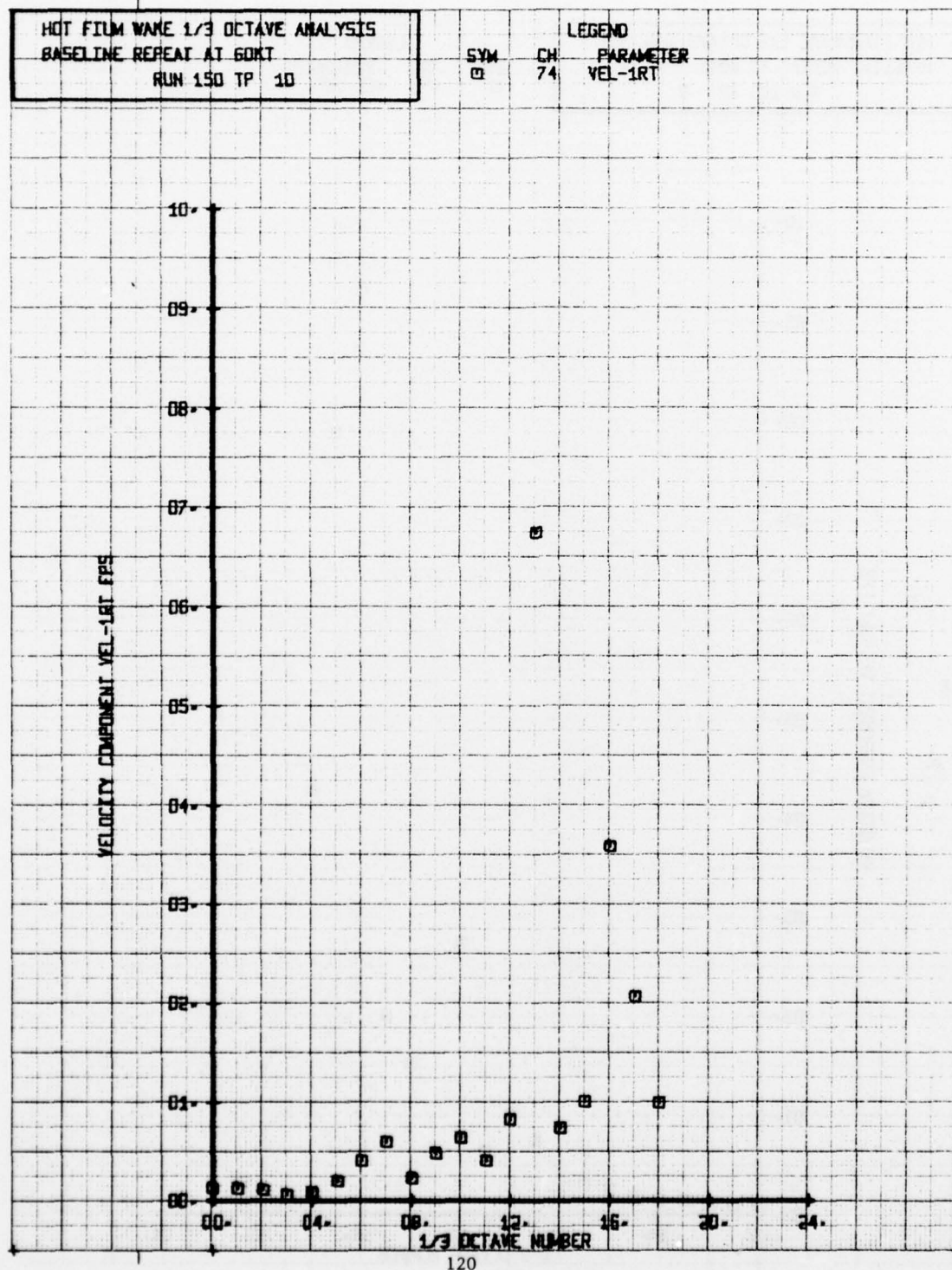




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60KT  
RUN 150 TP 10

SYM  
□

LEGEND  
CH 74  
PARAMETER  
VEL-1RT



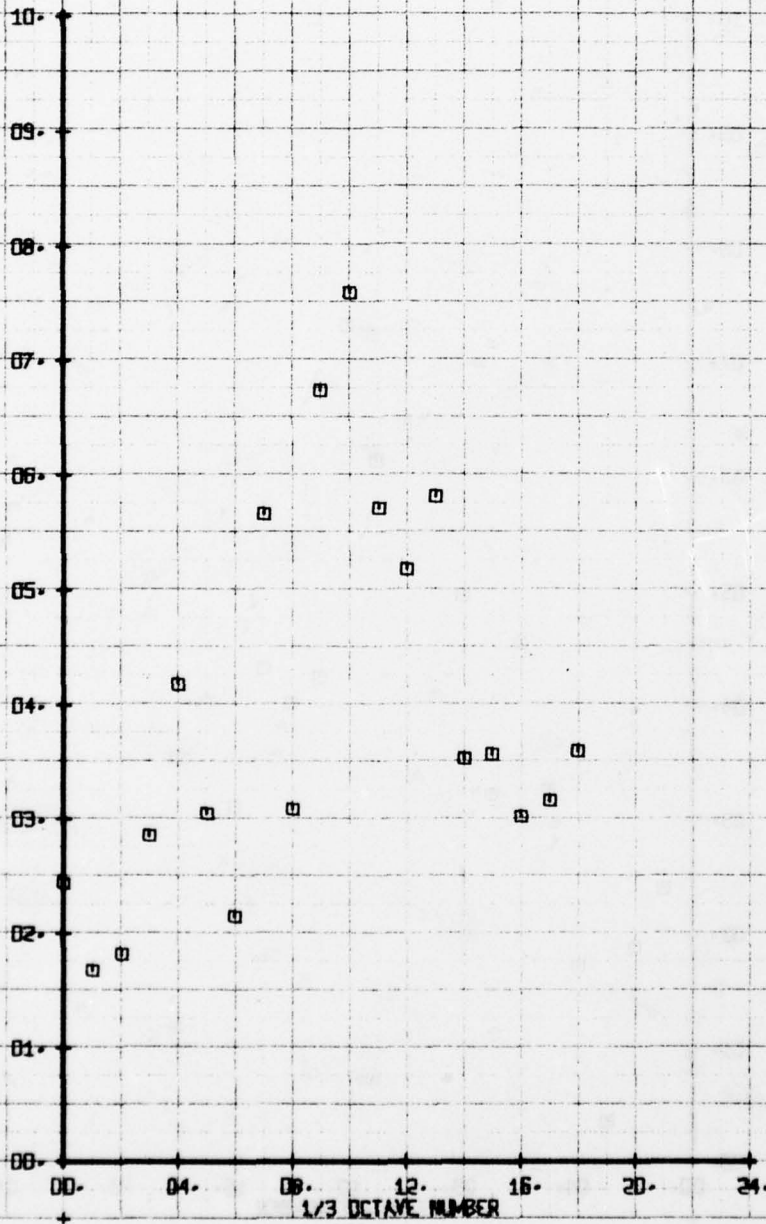
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60RT  
RUN 150 TP 2

SYM  
□

CH  
73

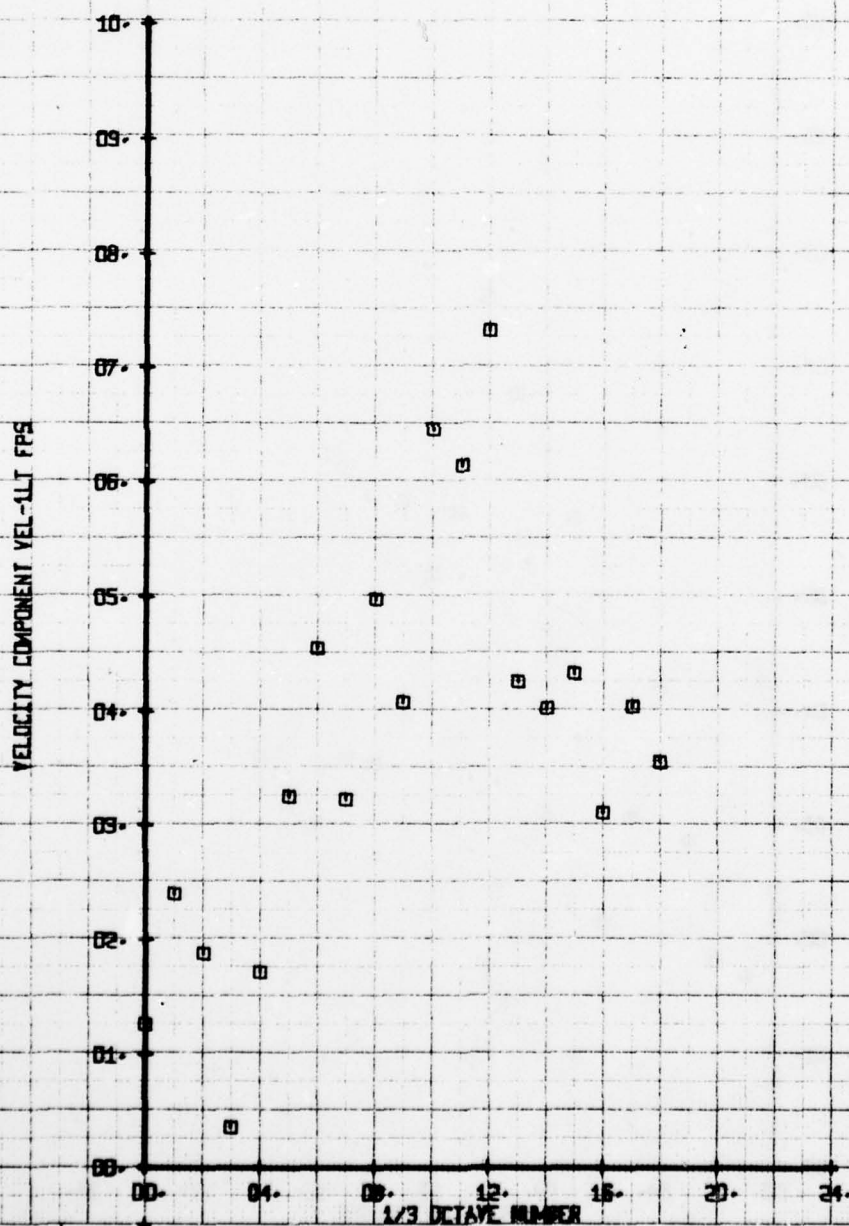
LEGEND  
PARAMETER  
VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 3

SYN CH PARAMETER  
 0 73 VEL-1LT



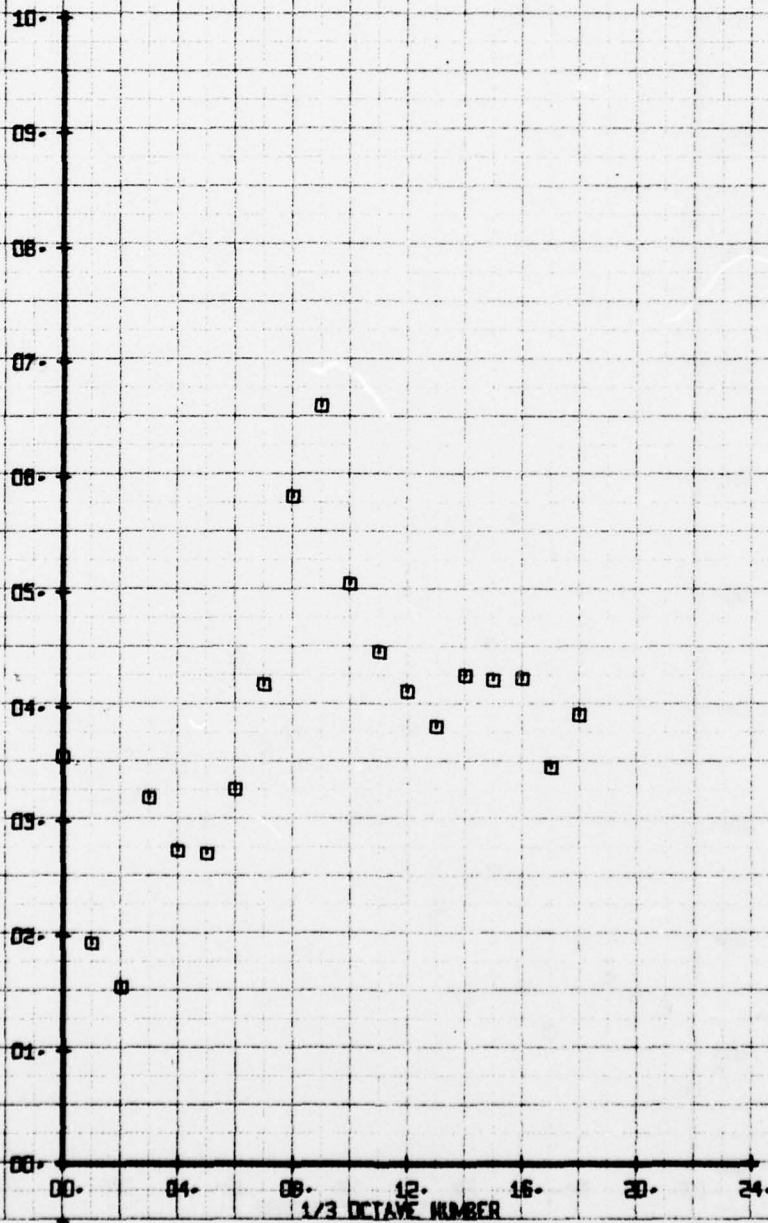
HOT FILM WAVE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 4

SYM  
 □

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS





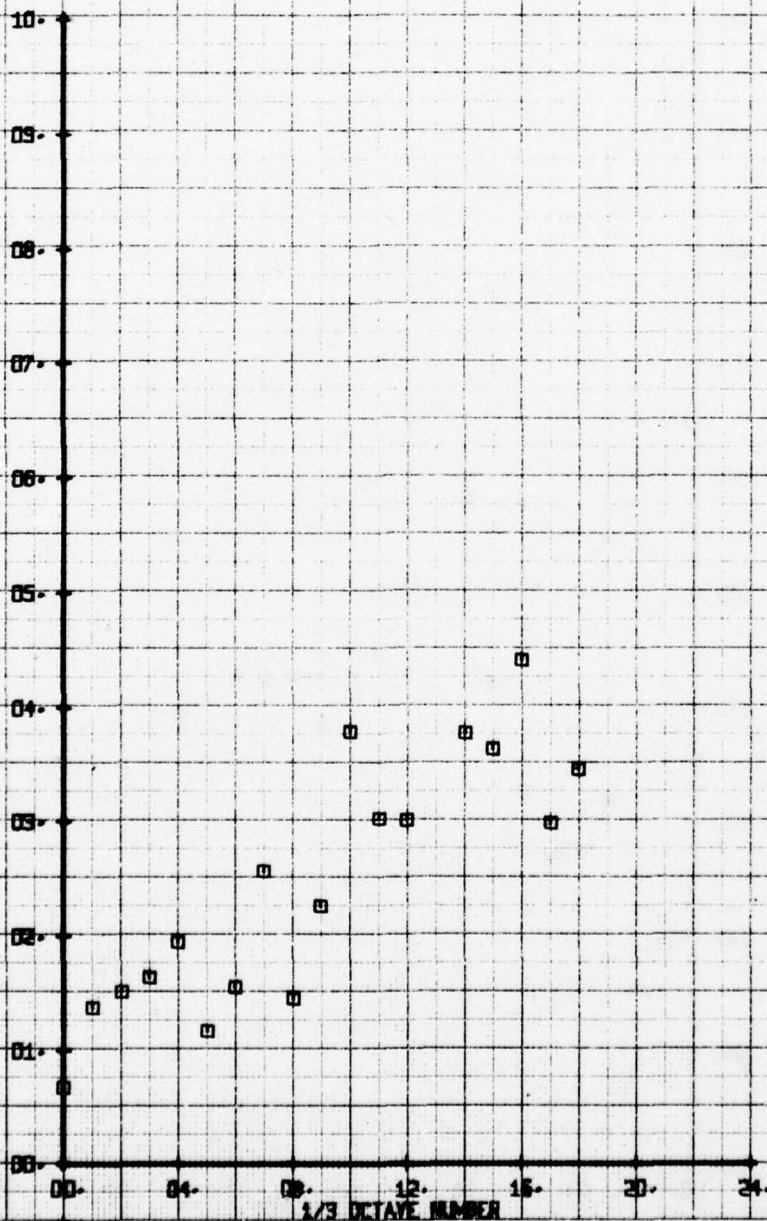
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60Kt  
 RUN 150 TP 5

SYM  
 □

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



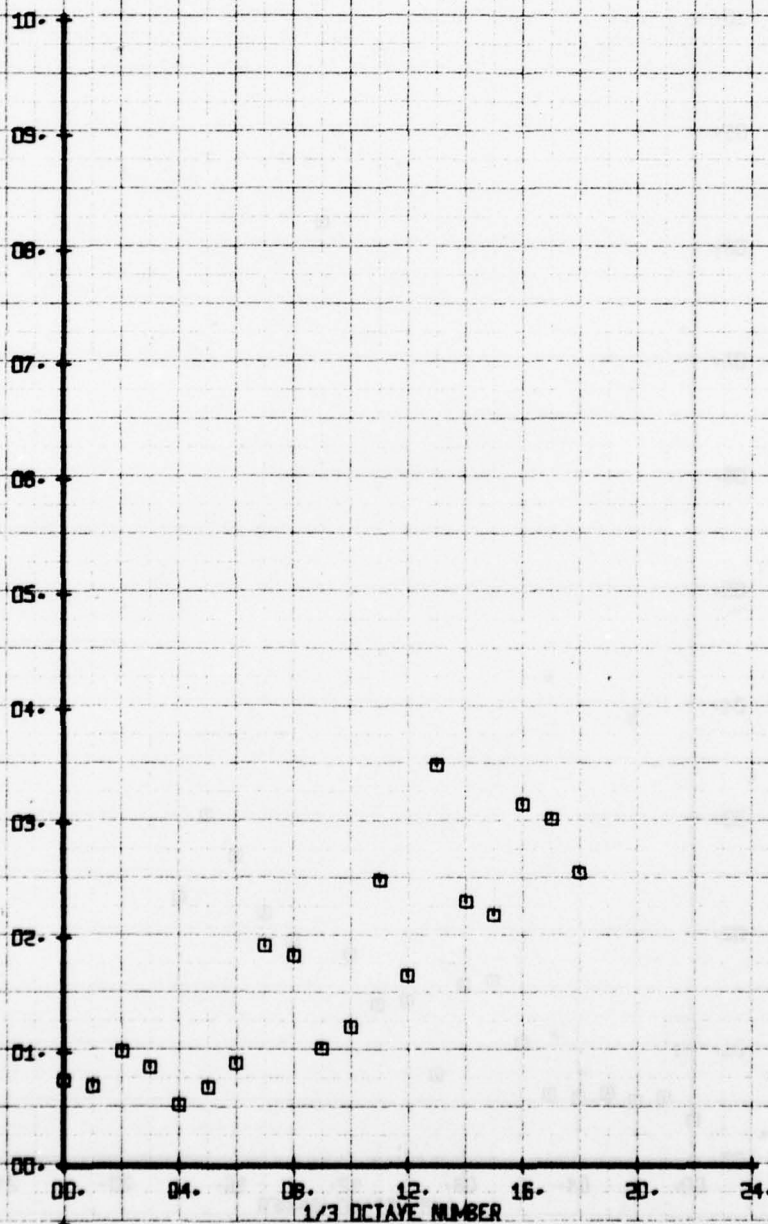
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 6

SYM  
 0

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

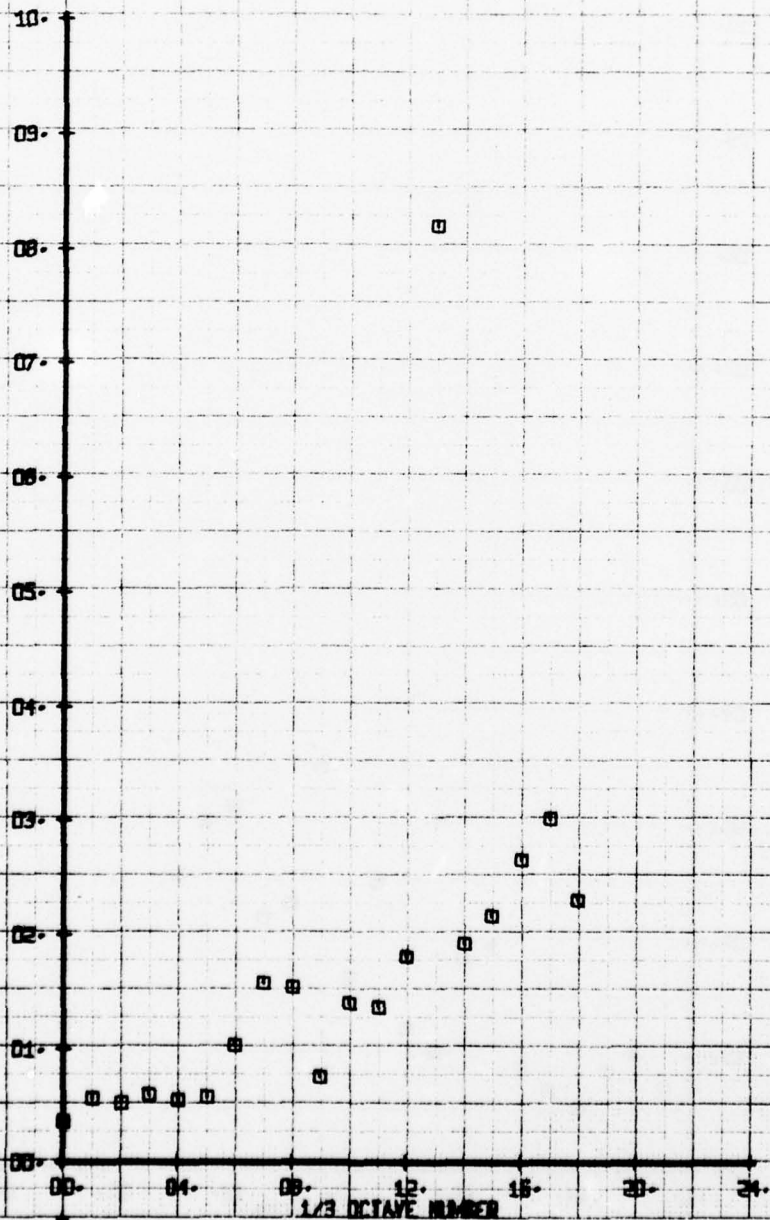
VELOCITY COMPONENT VEL-1LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 7

SYN CH PARAMETER  
 0 73 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASLINE REPEAT AT 50KT

RUN 150 TP B

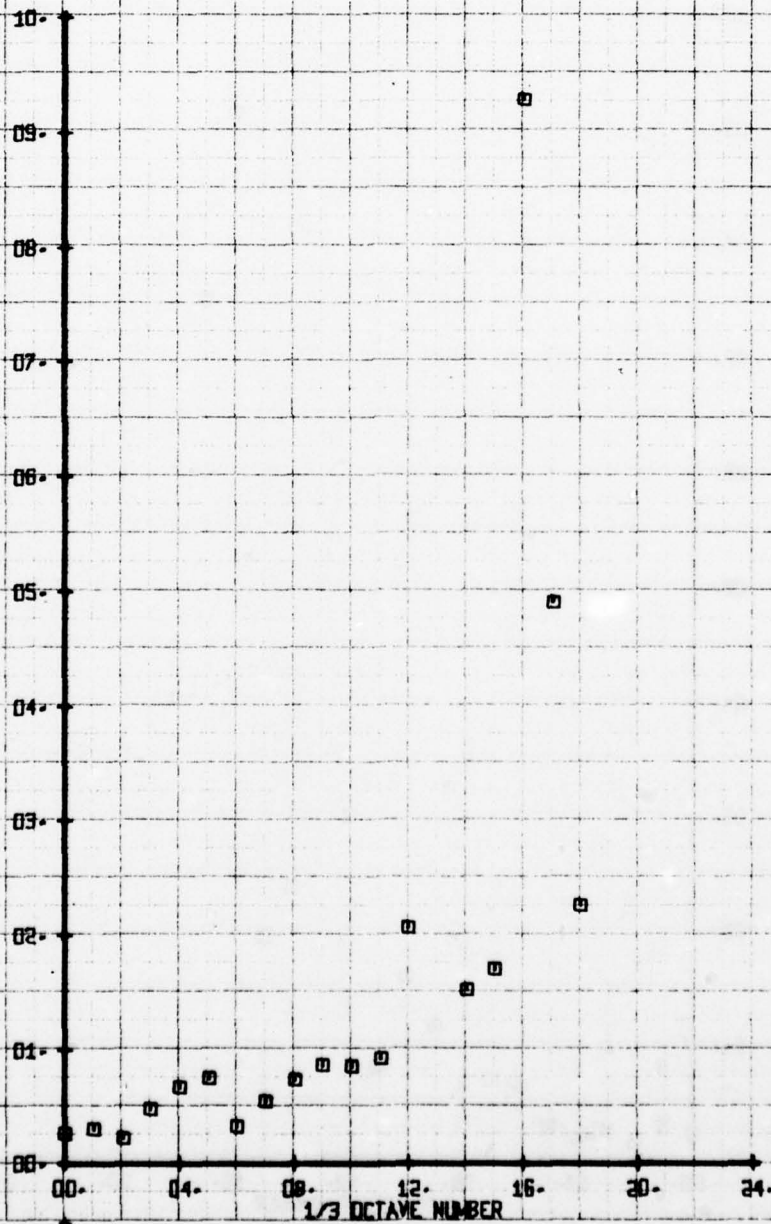
SYM  
□

CH  
73

LEGEND

PARAMETER  
VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS





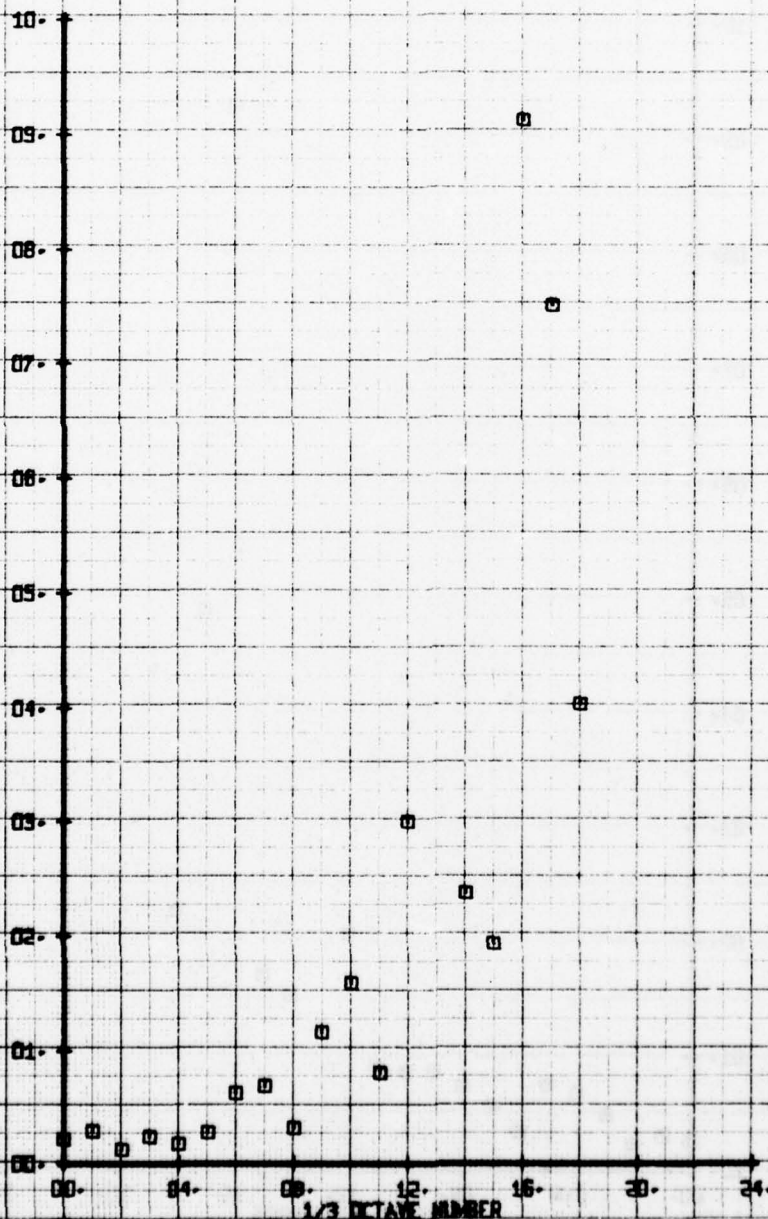
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60KTS  
 RUN 150 TP 9

SYM  
 □

EH  
 73

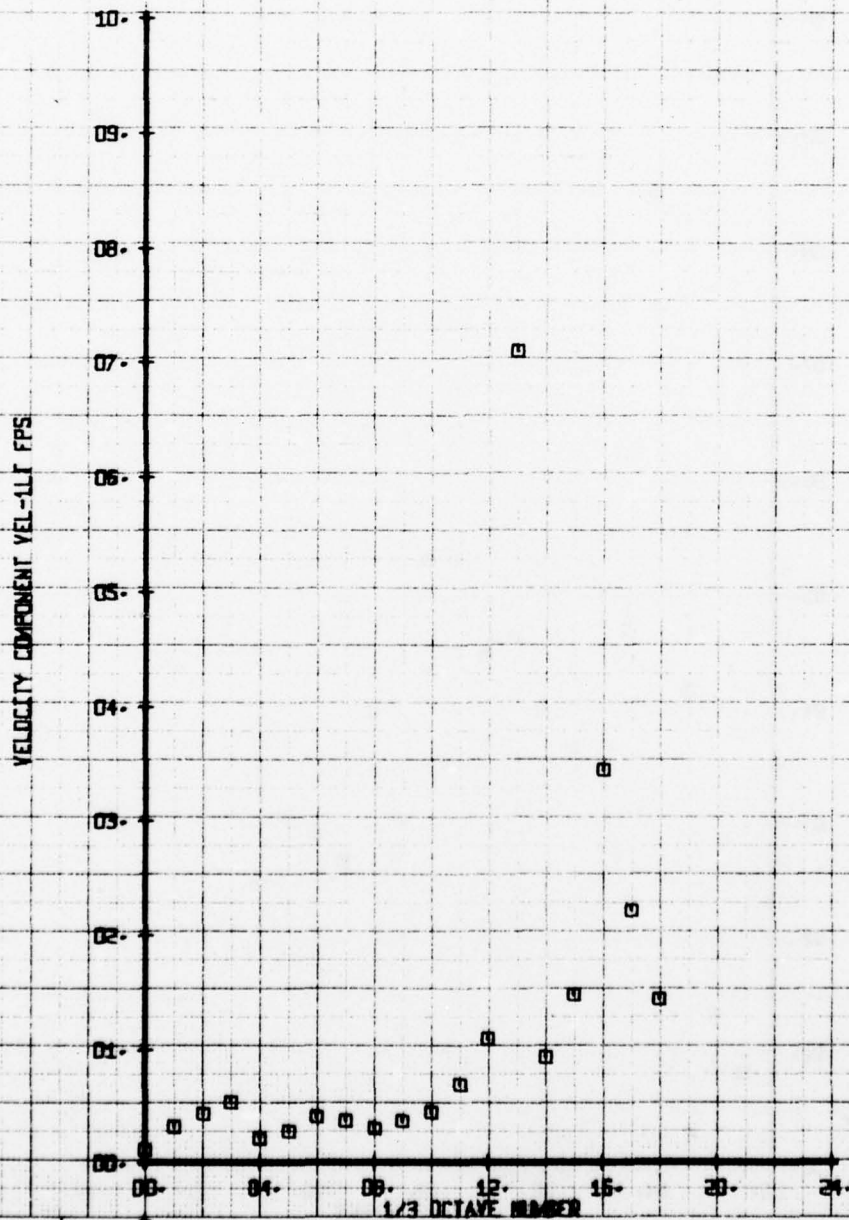
LEGEND  
 PARAMETER  
 VEL-1LT

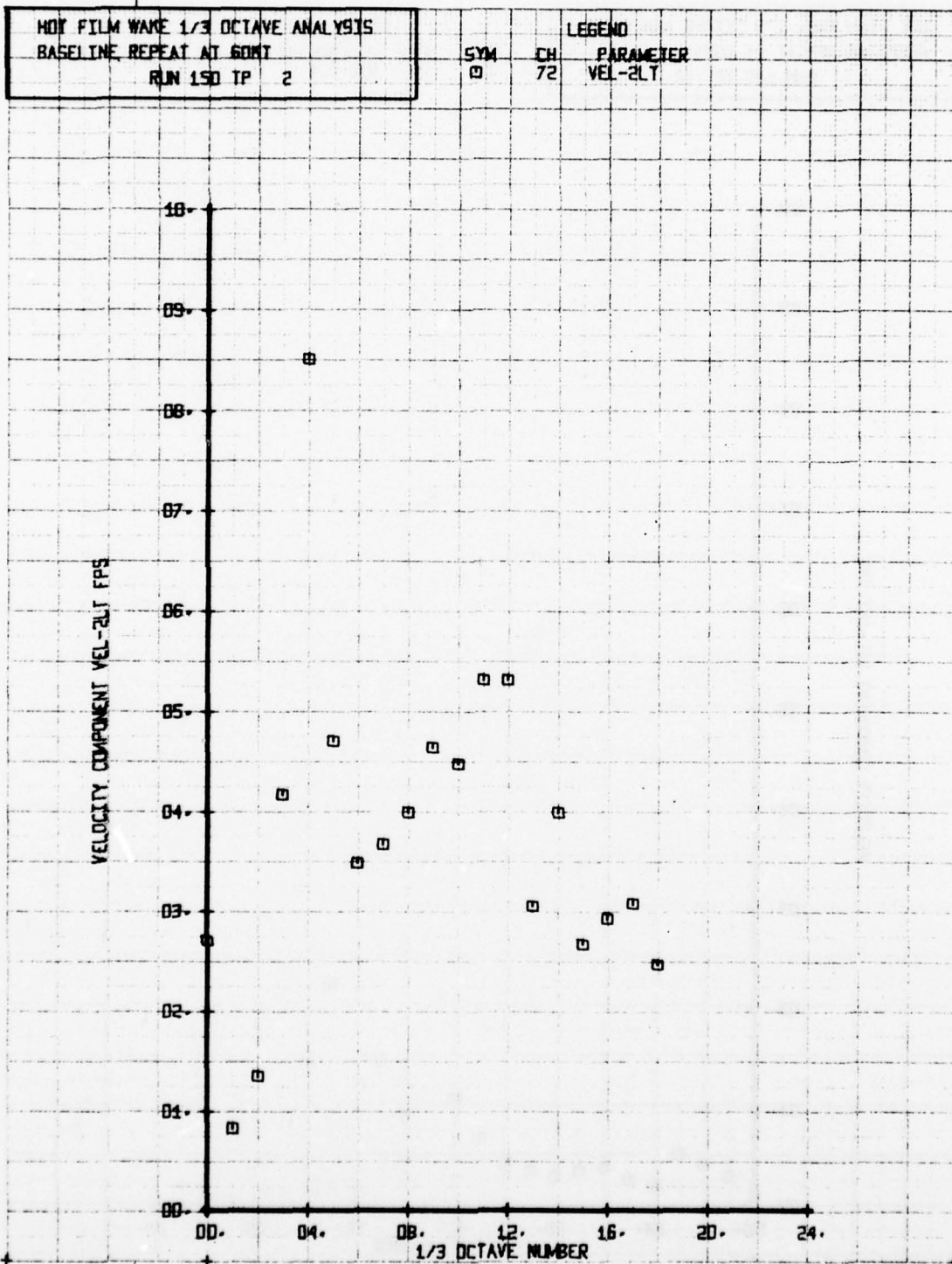
VELOCITY COMPONENT VEL-1LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 10

LEGEND  
 SYM CH PARAMETER  
 □ 73 VEL-1LT





HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASLINE REPEAT AT 60MT

RUN 1SD TP 3

SYM

0

CH

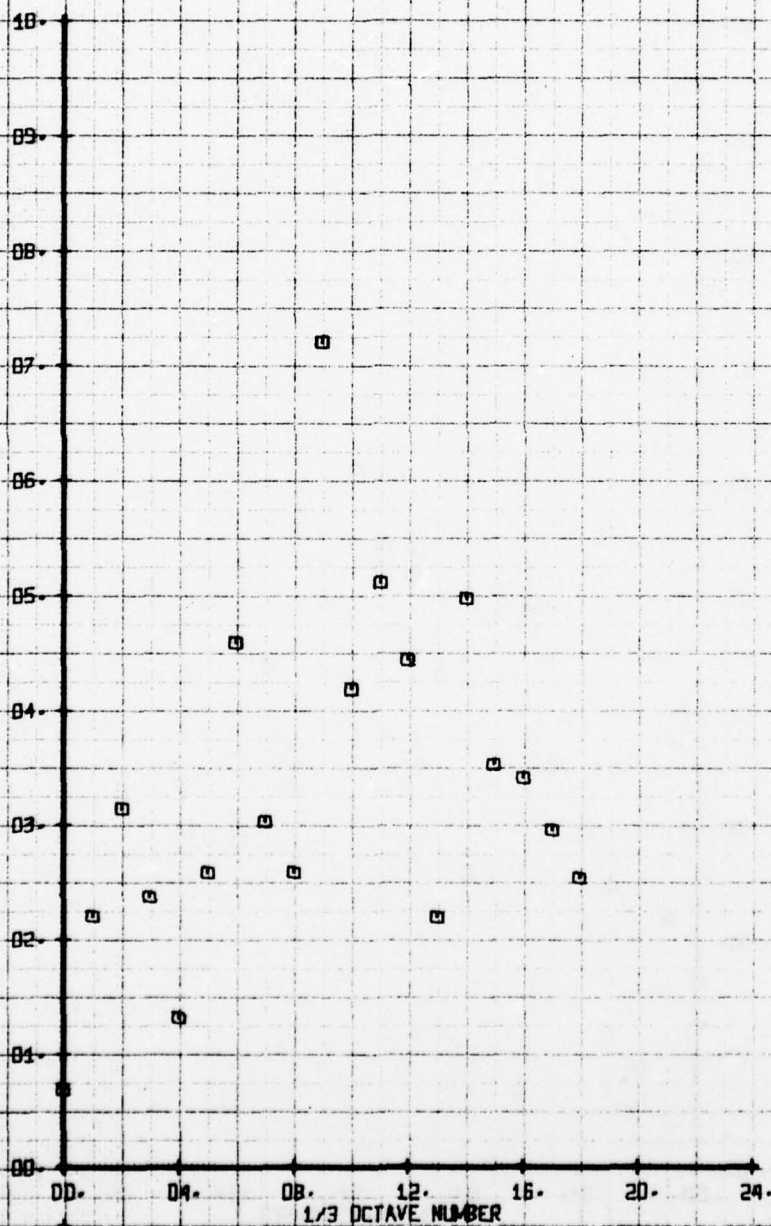
72

LEGEND

PARAMETER

VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS



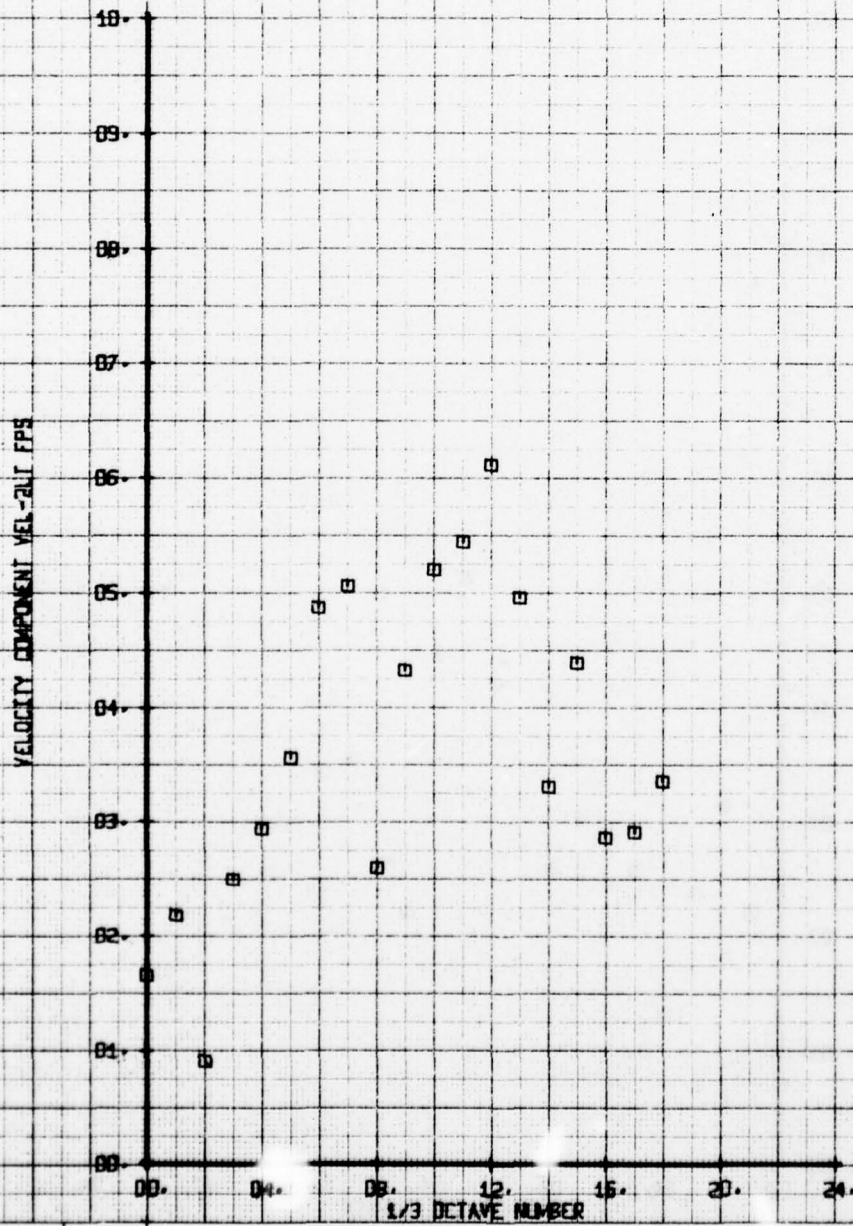


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60KT  
 RUN 190 TP 4

SYM  
 □

CH  
 72

LEGEND  
 PARAMETER  
 VEL-2LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASELINE REPEAT AT 60MT

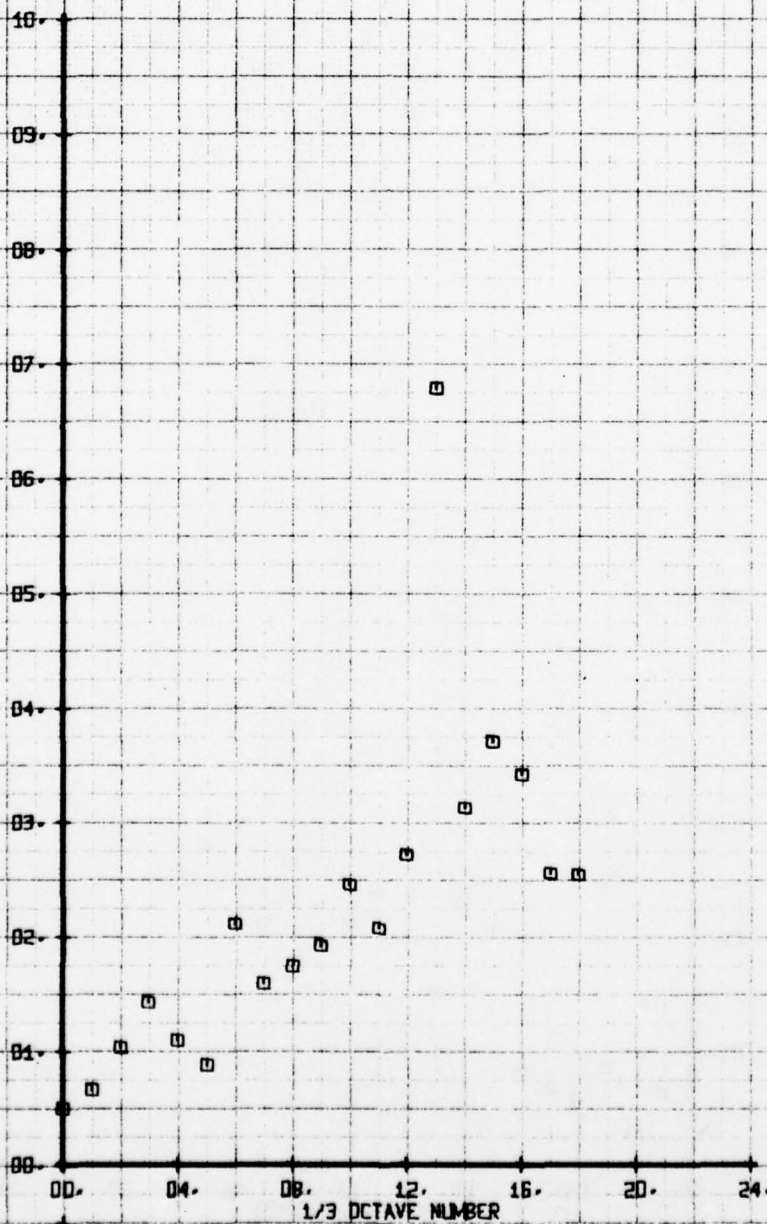
RUN 150 TP 5

SYM  
□

CH  
72

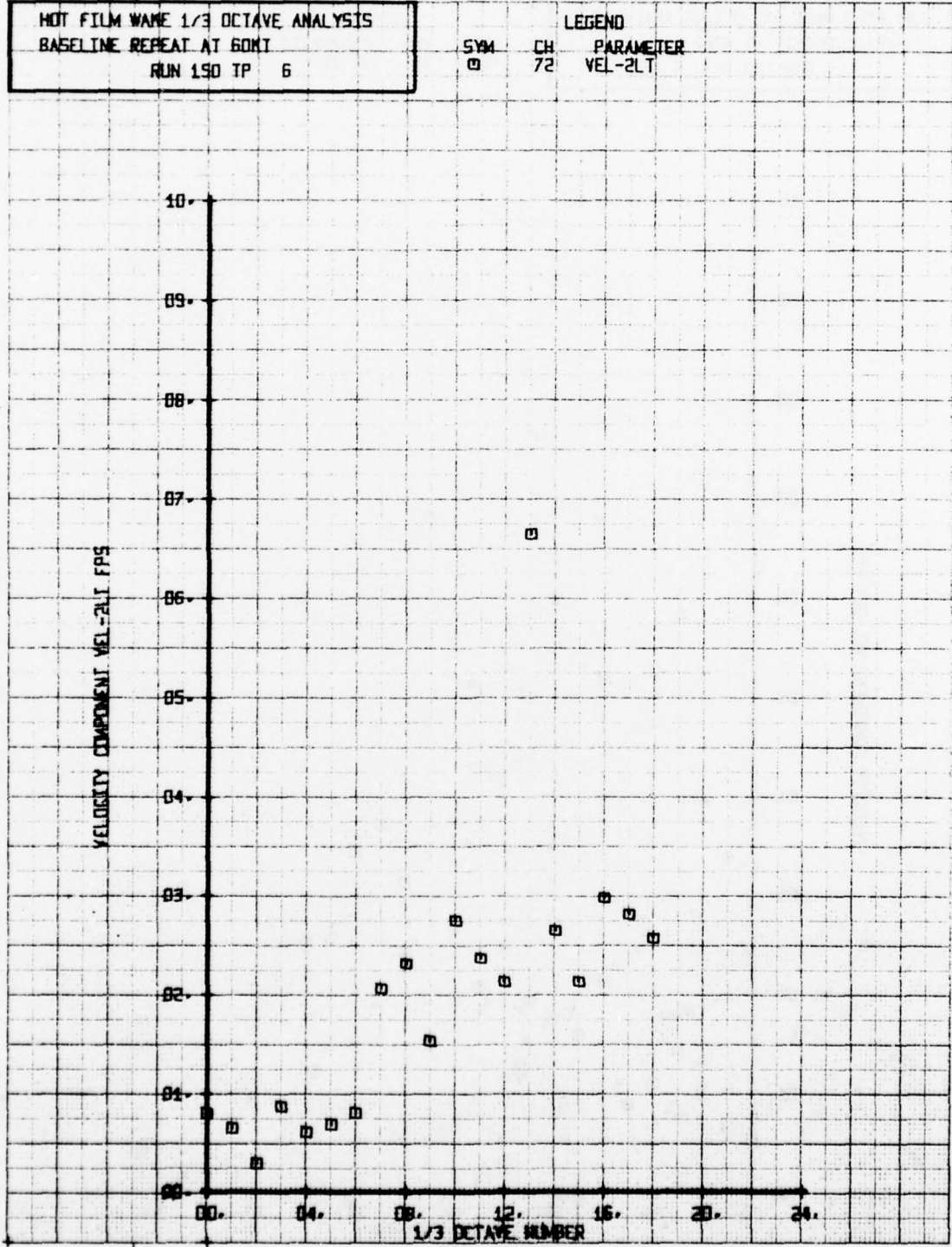
LEGEND  
PARAMETER  
VEL-ZLT

VELOCITY COMPONENT VEL-ZLT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 6

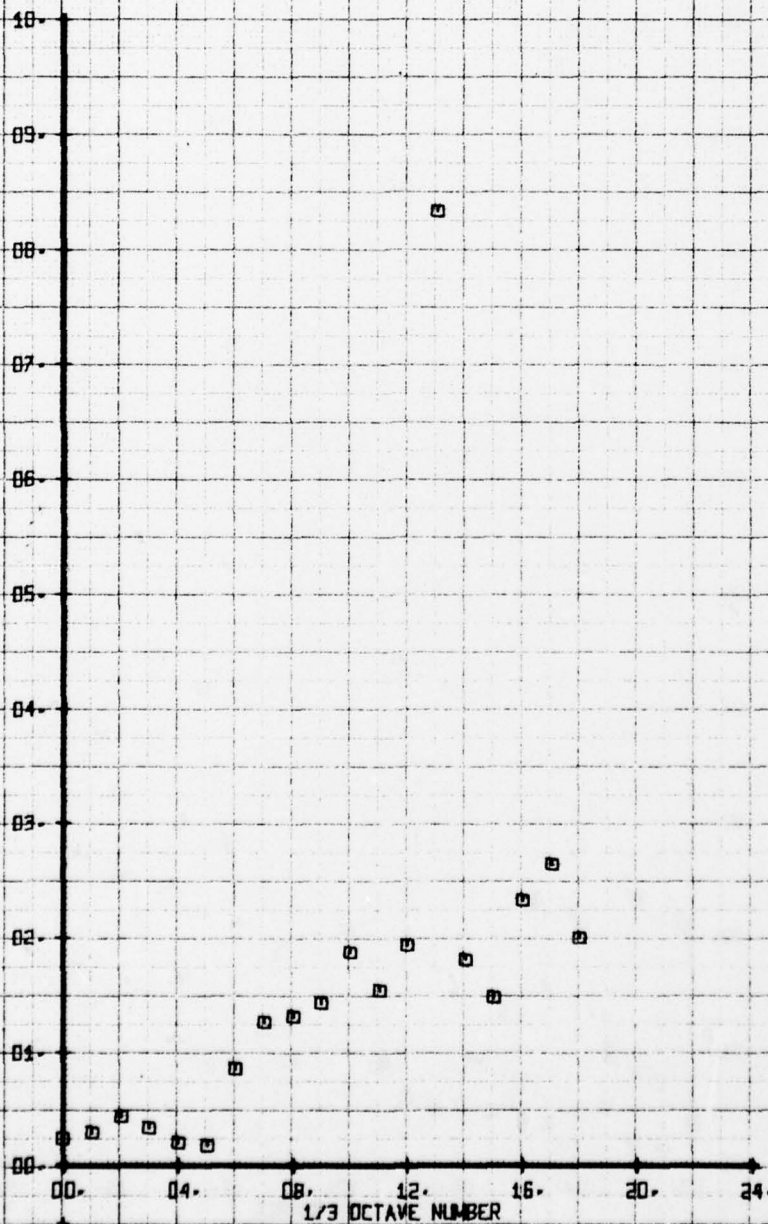
SYM	CH	PARAMETER
□	72	VEL-2LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60KT  
 RUN 150 TP 7

SYM	CH	PARAMETER
□	72	VEL-2LT

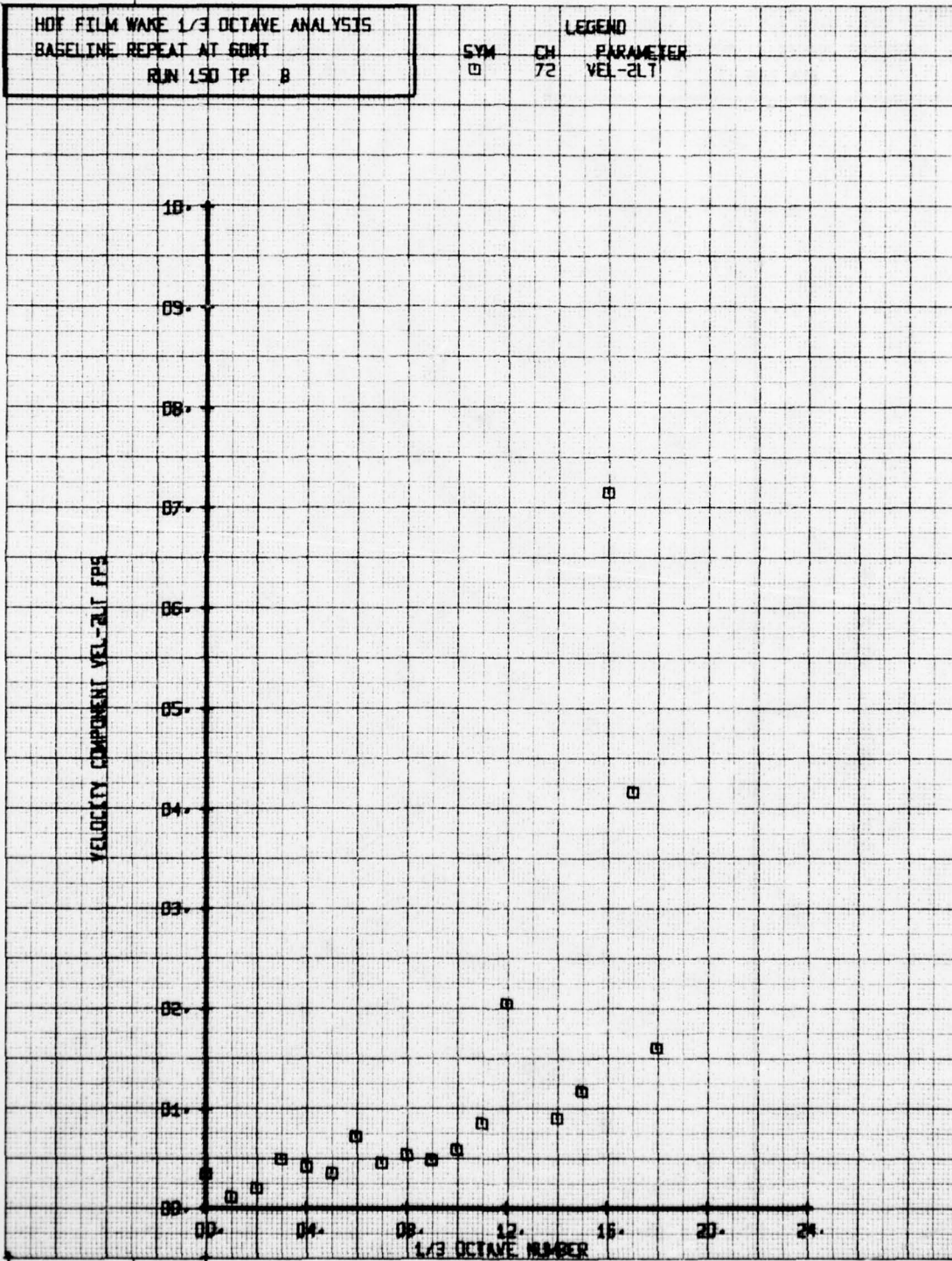
VELOCITY COMPONENT VEL-2LT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 8

LEGEND		
SYM	CH	PARAMETER
□	72	VEL-2LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASLINE REPEAT AT 60MT

RUN 150 TP 9

SYM

□

CH

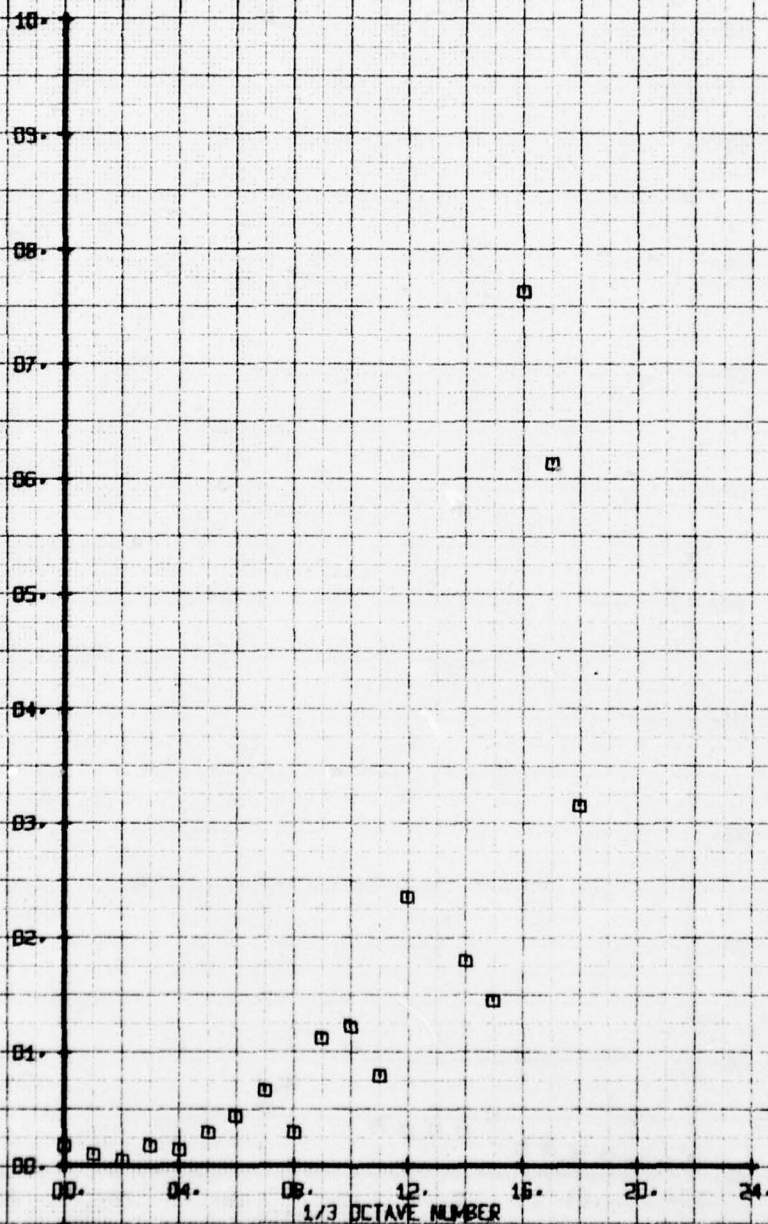
72

LEGEND

PARAMETER

VEL-ZLT

VELOCITY COMPONENT VEL-ZLT FPS



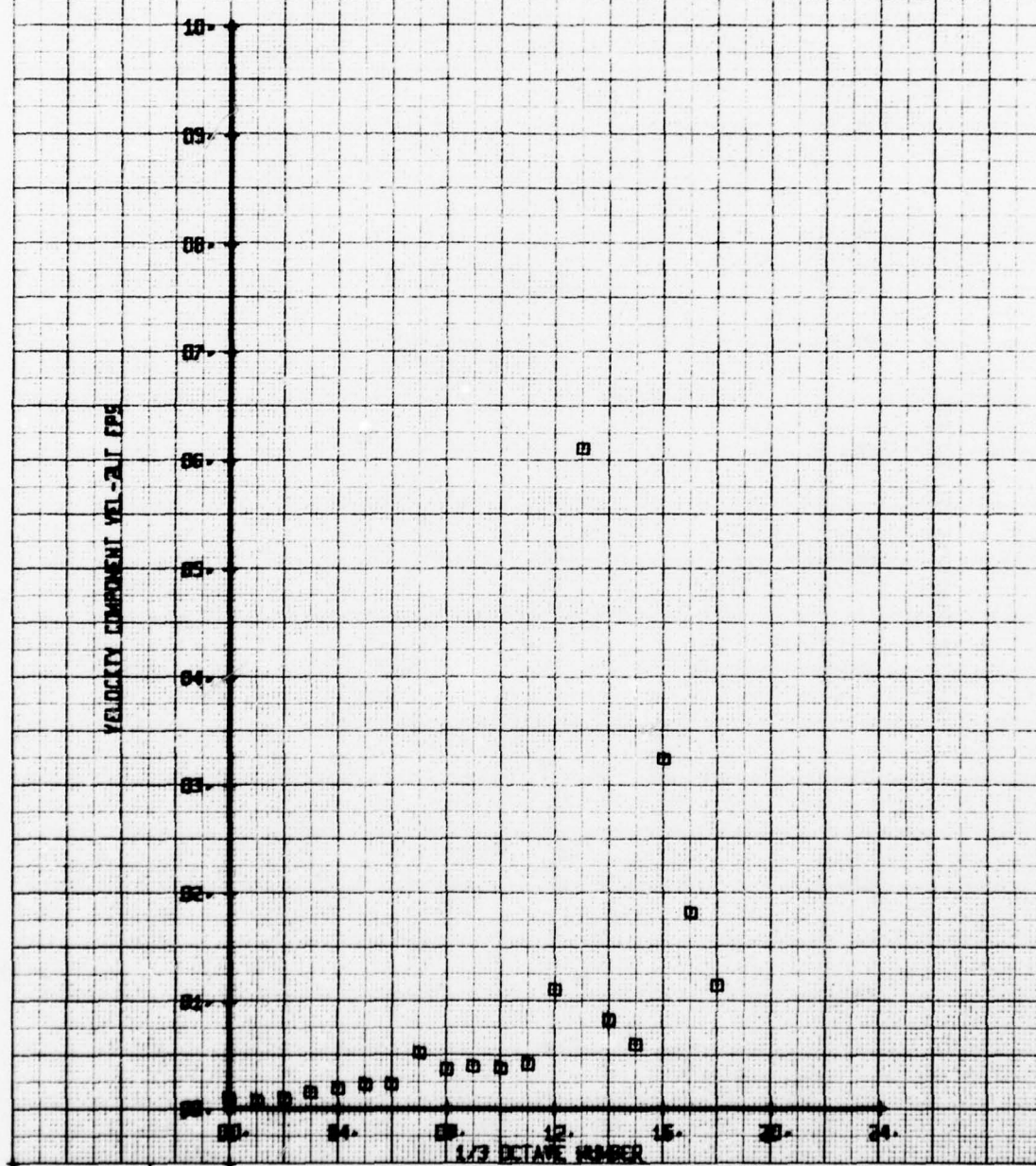
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60HT  
 RUN 150 TP 10

SYM  
 0

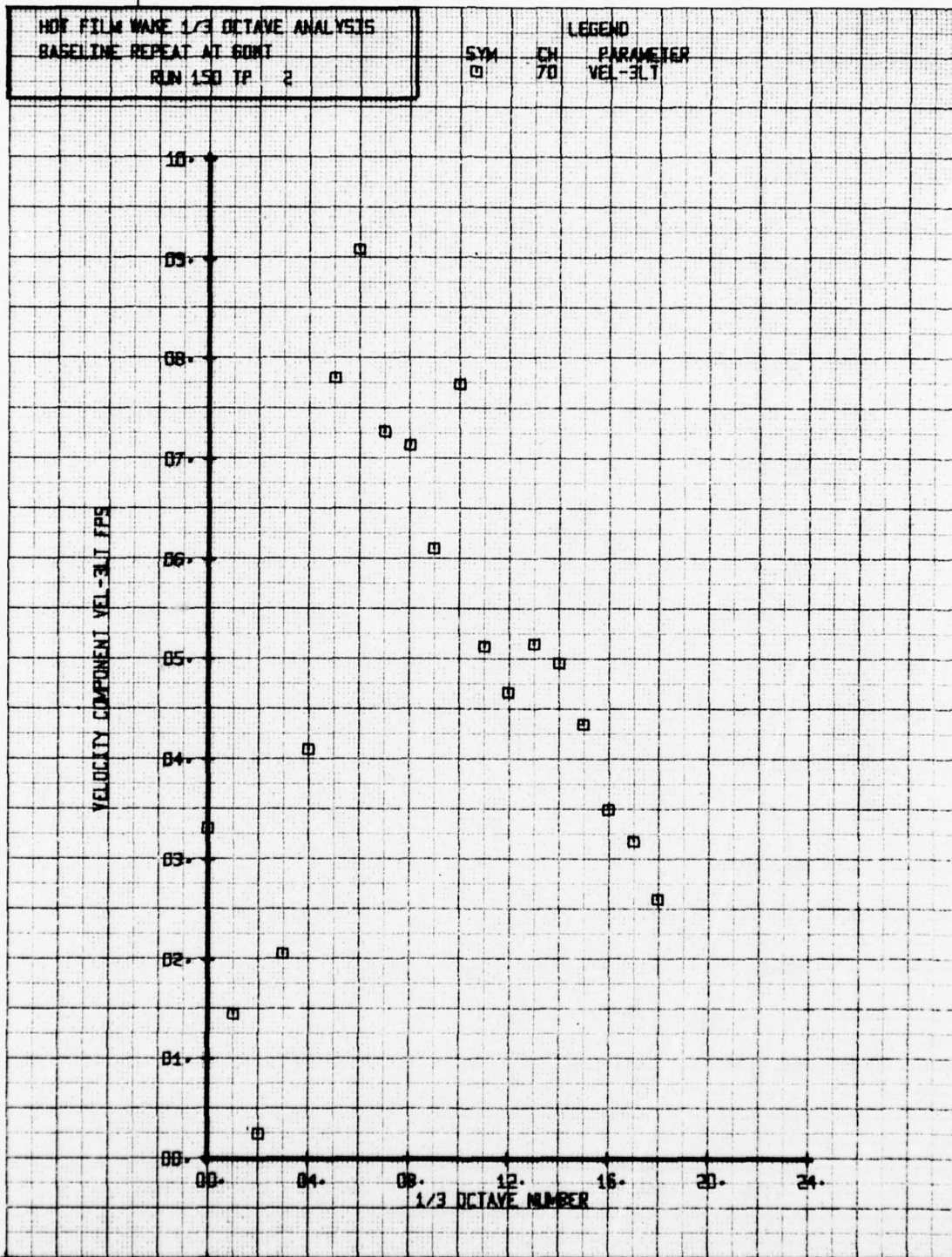
CH  
 72

LEGEND  
 PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS



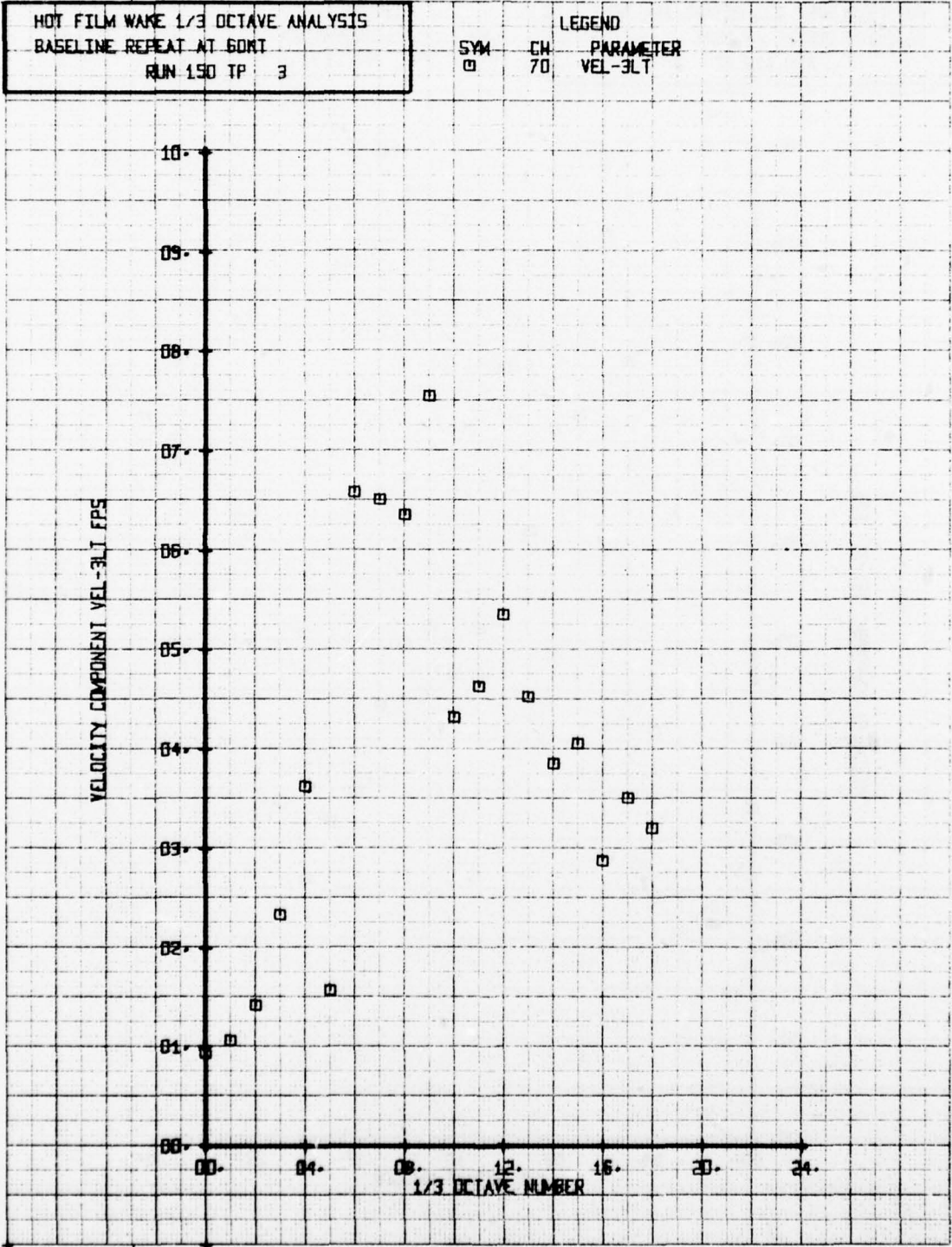






HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60MT  
RUN 150 TP 3

LEGEND		
SYM	CH	PARAMETER
□	70	VEL-3LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASELINE REPEAT AT 60MT

RUN 150 TP 4

SYM

□

CH

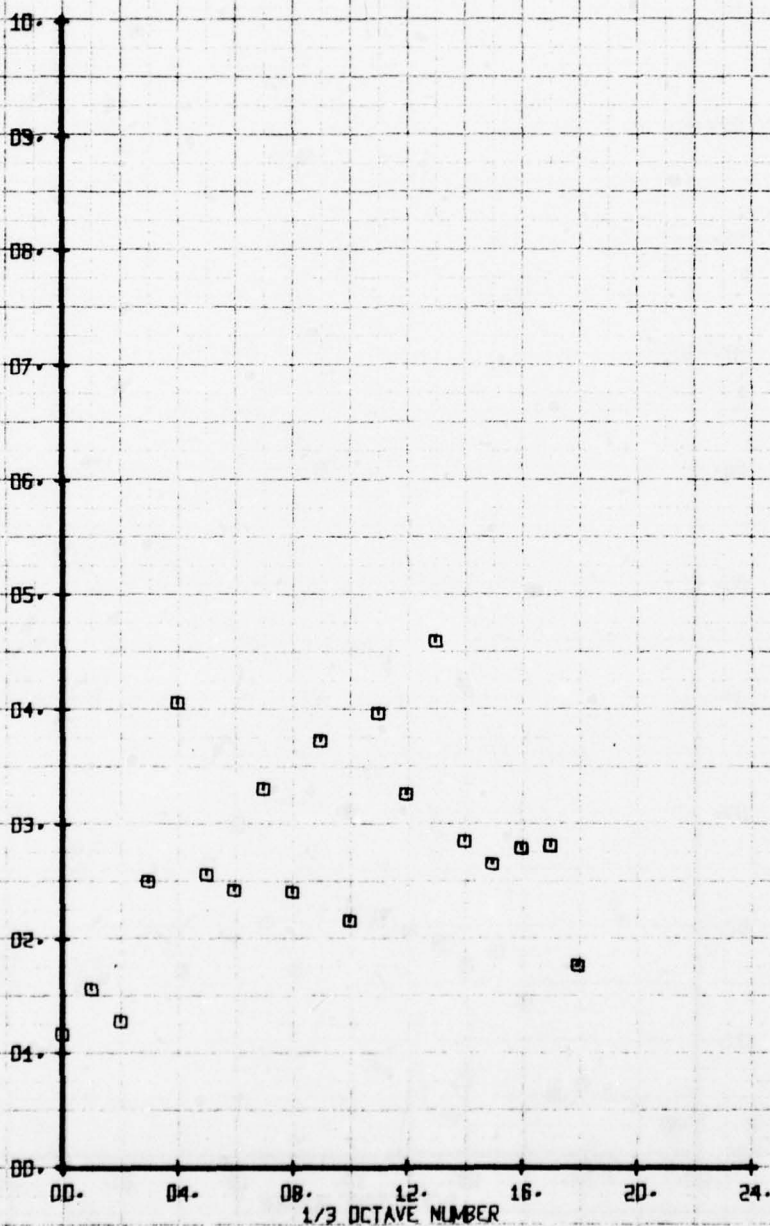
70

LEGEND

PARAMETER

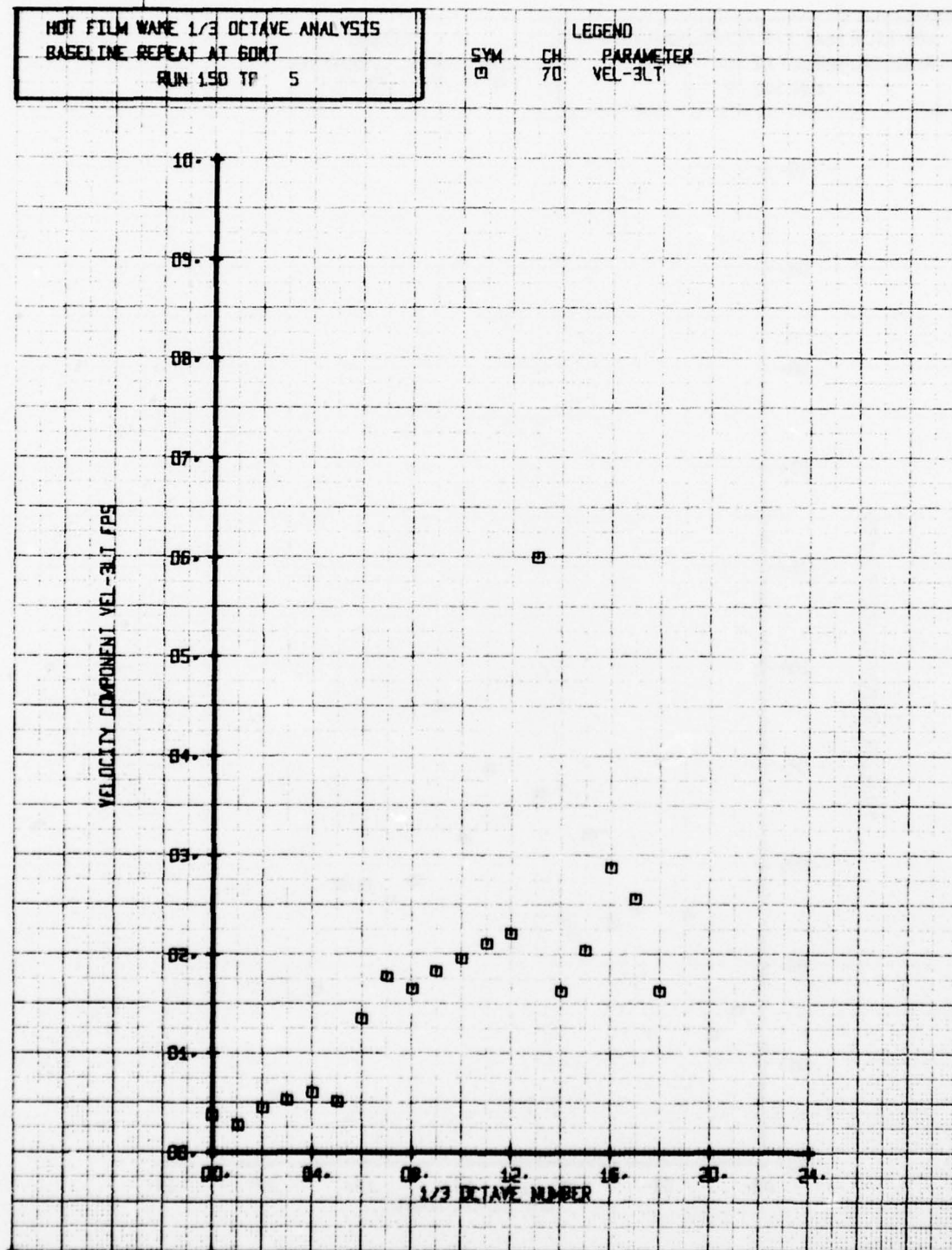
VEL-3LT

VELOCITY COMPONENT VEL-3LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 5

SYN CH PARAMETER  
 0 70 VEL-3LT



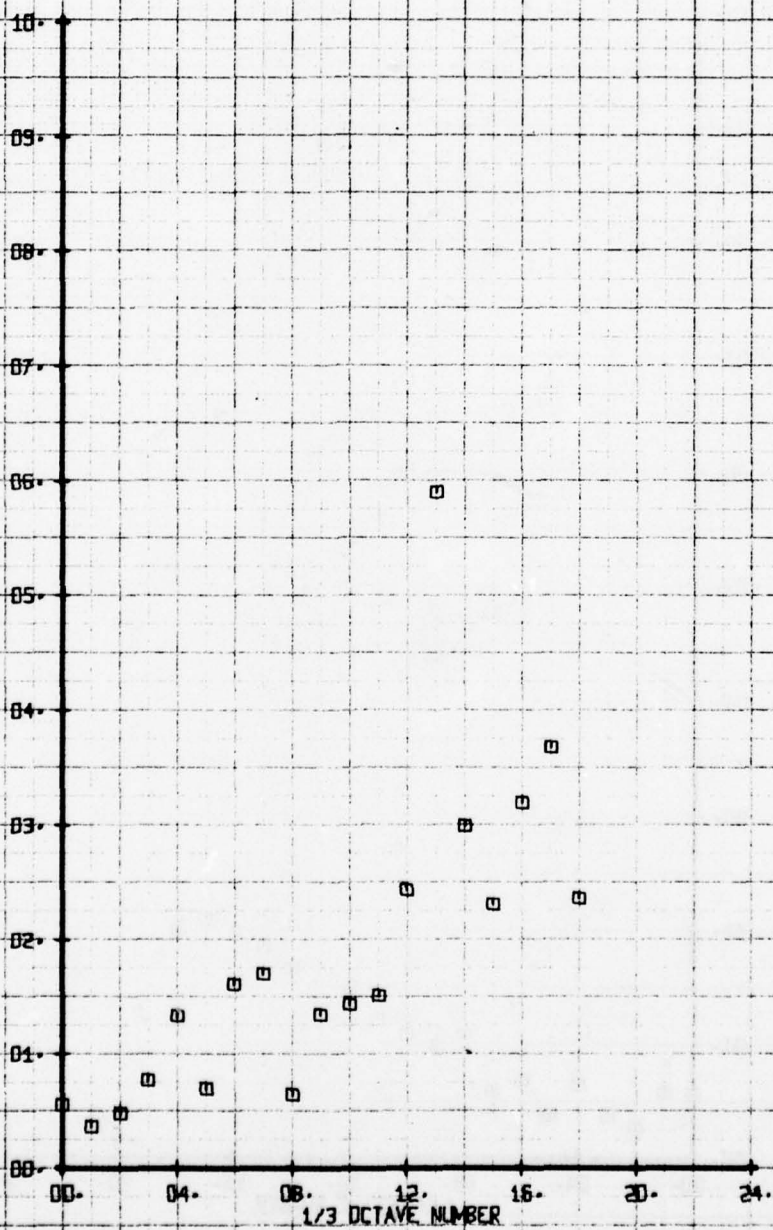
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE REPEAT AT 60MT  
 RUN 150 TP 6

SYM  
 □

CH  
 70

LEGEND  
 PARAMETER  
 VEL-3LT

VELOCITY COMPONENT VEL-3LT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASLINE REPEAT AT 60MT

RUN 150 TP 7

SYM

□

CH

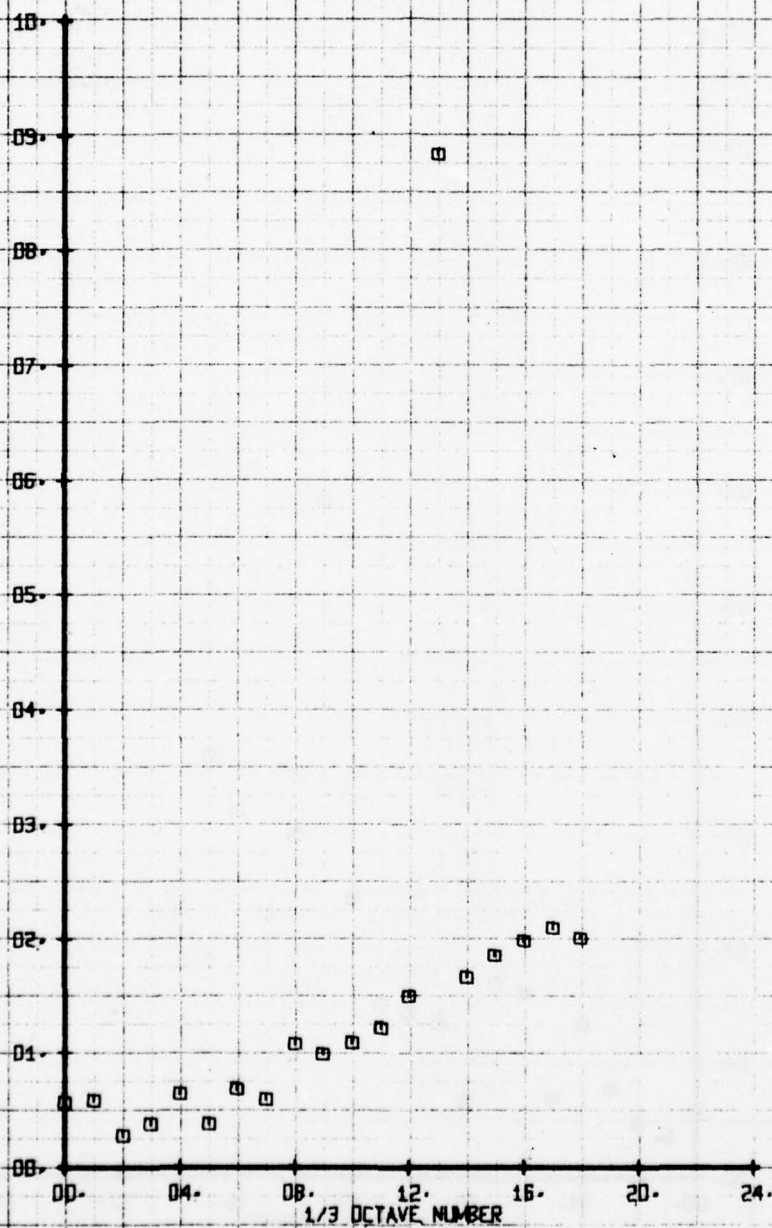
70

LEGEND

PARAMETER

VEL-3LT

VELOCITY COMPONENT VEL-3LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASLINE REPEAT AT 60MT

RUN 150 TP 8

SYM

□

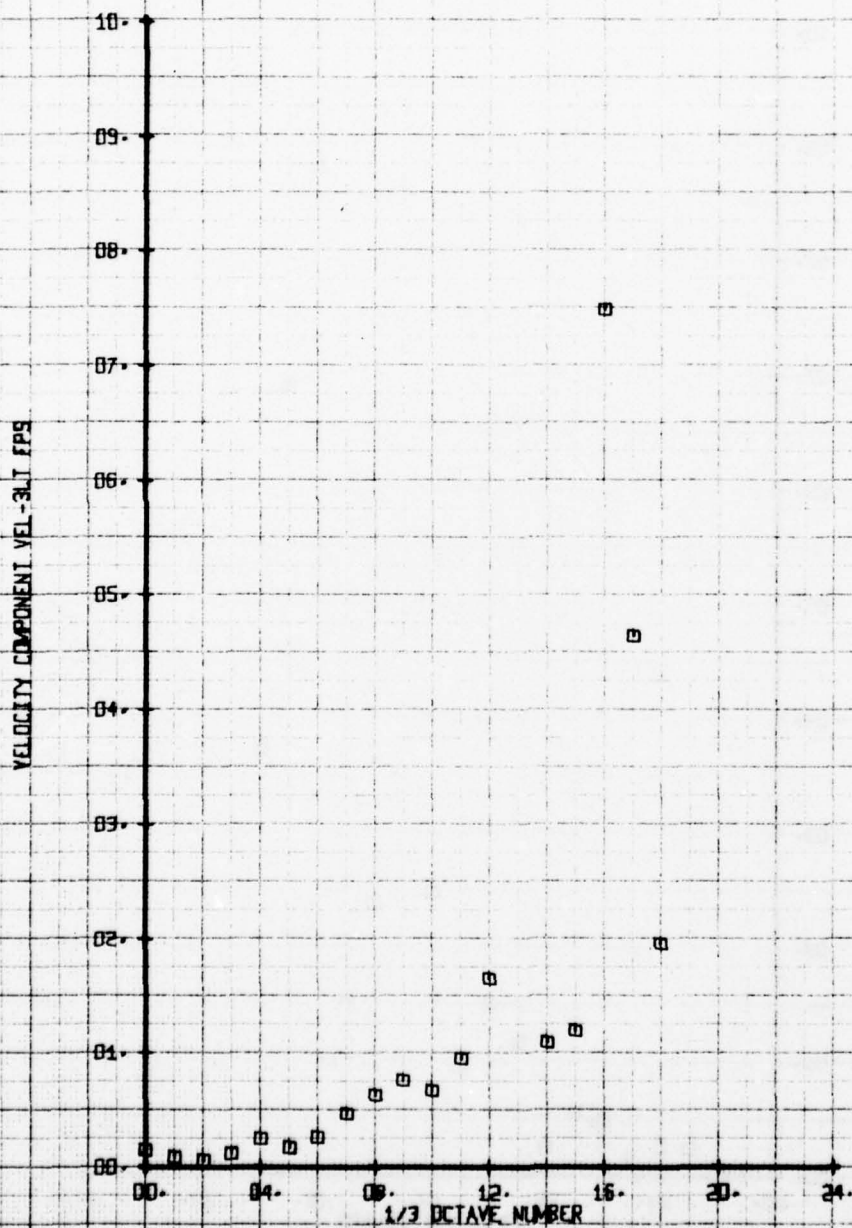
CH

70

LEGEND

PARAMETER

VEL-3LT



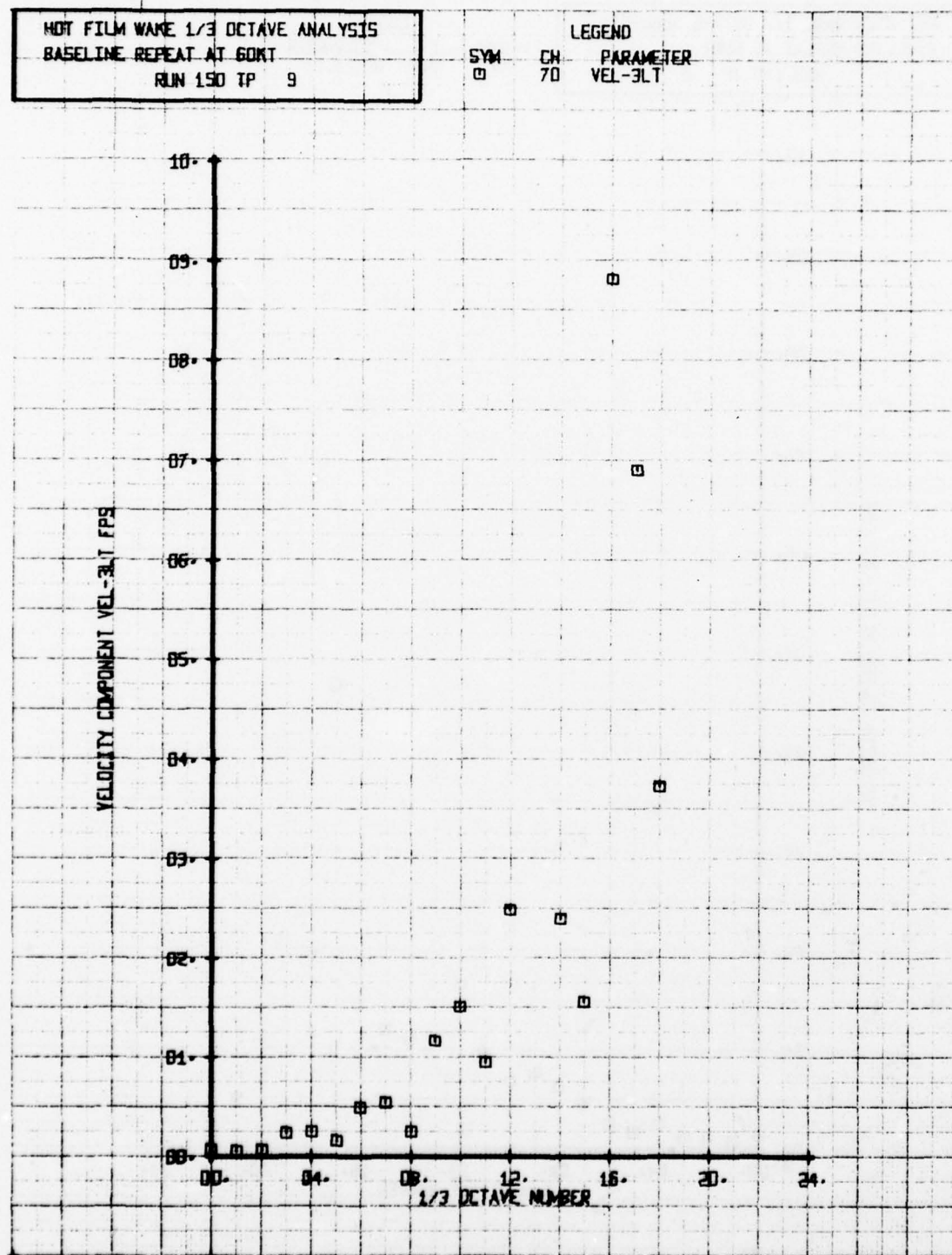
NOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE REPEAT AT 60KT  
RUN 150 TP 9

SYM  
□

CH  
70

LEGEND

PARAMETER  
VEL-3LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS

BASELINE REPEAT AT 60MT

RUN 150 TP 10

SYM

□

CH

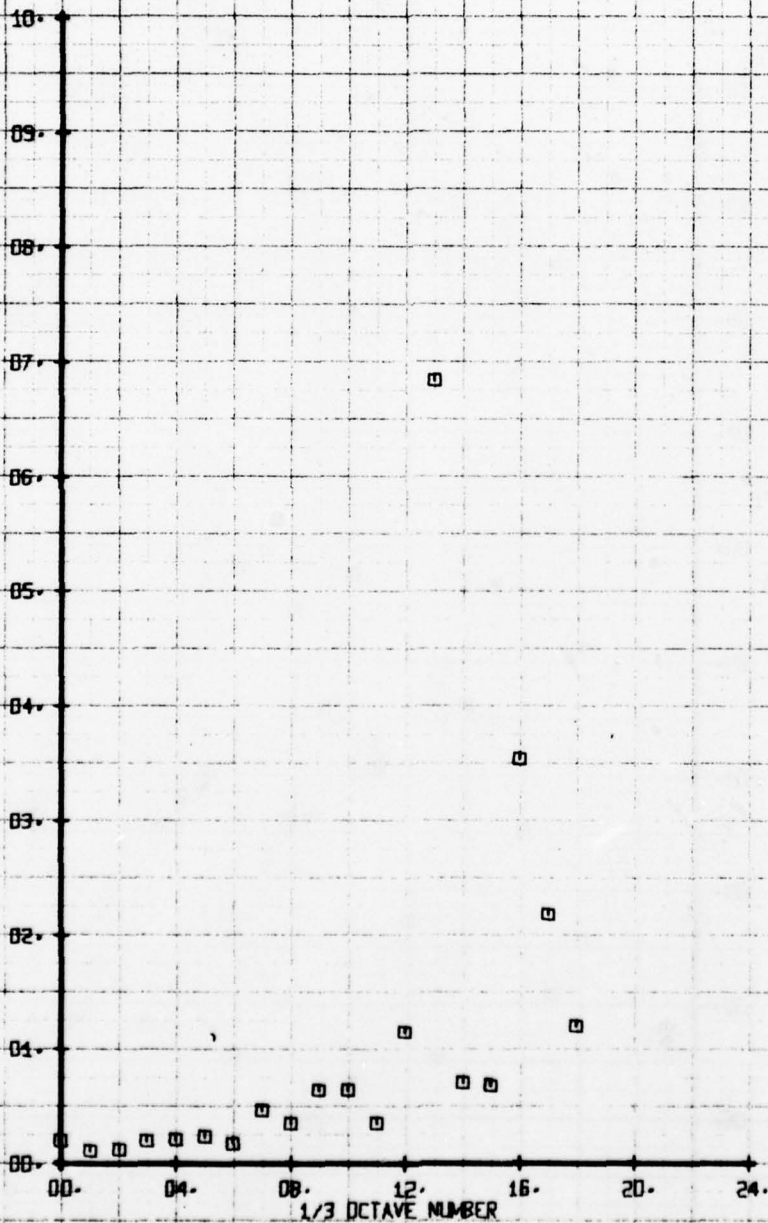
70

LEGEND

PARAMETER

VEL-3LT

VELOCITY COMPONENT VEL-3LT FPS



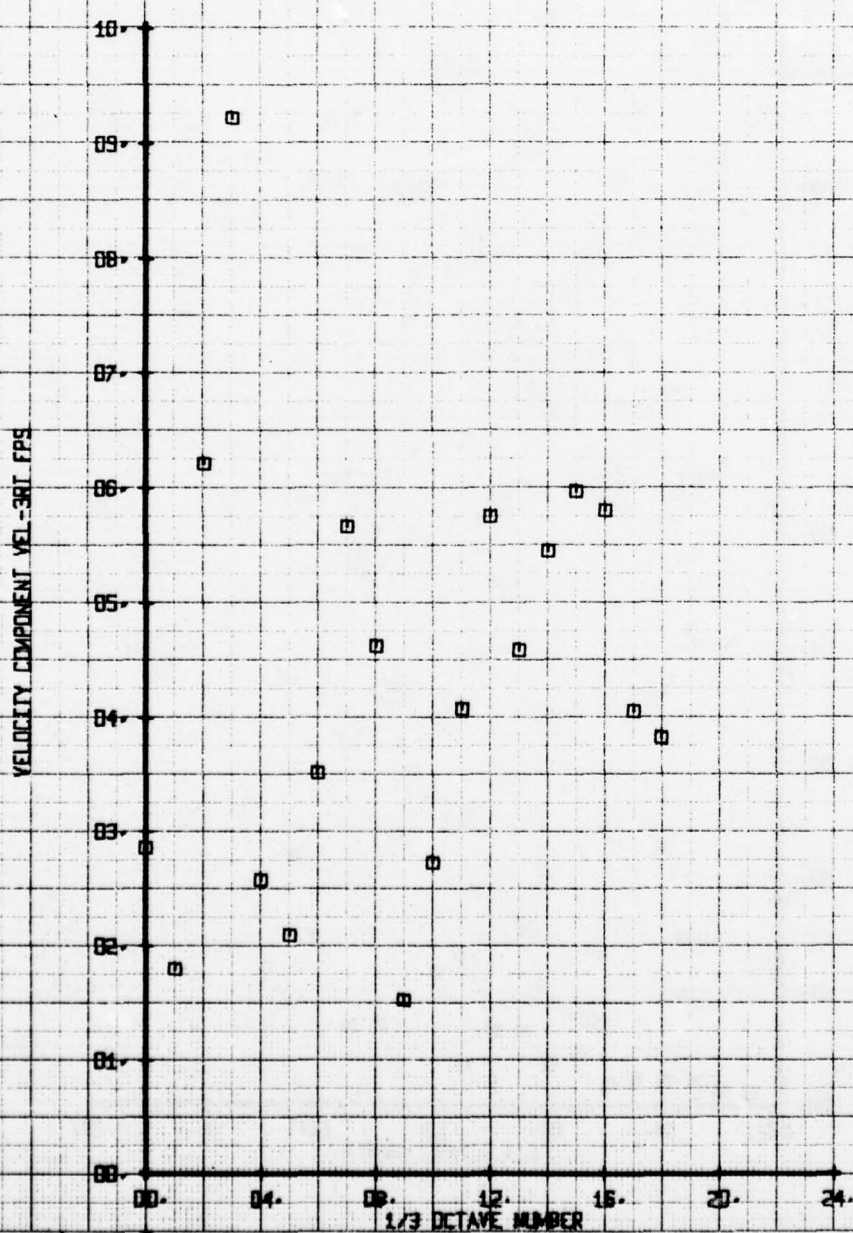


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/L-BLADES OFF, ROT. HUB  
 RUN 160 TP 5

SYM  
 □

CH  
 71

LEGEND  
 PARAMETER  
 VEL-3RT



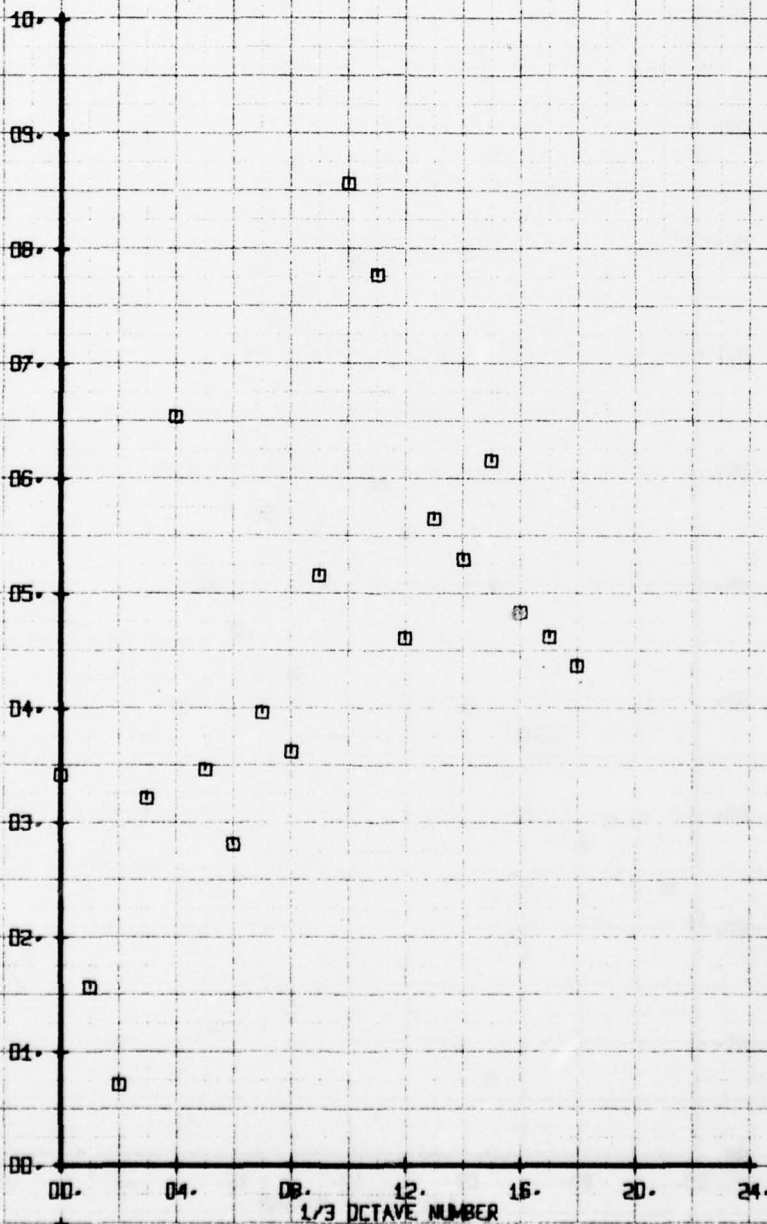
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/1-BLADES OFF, ROT. HUB  
 RUN 160 TP 6

SYM  
 □

CN  
 71

LEGEND  
 PARAMETER  
 VEL-3RT

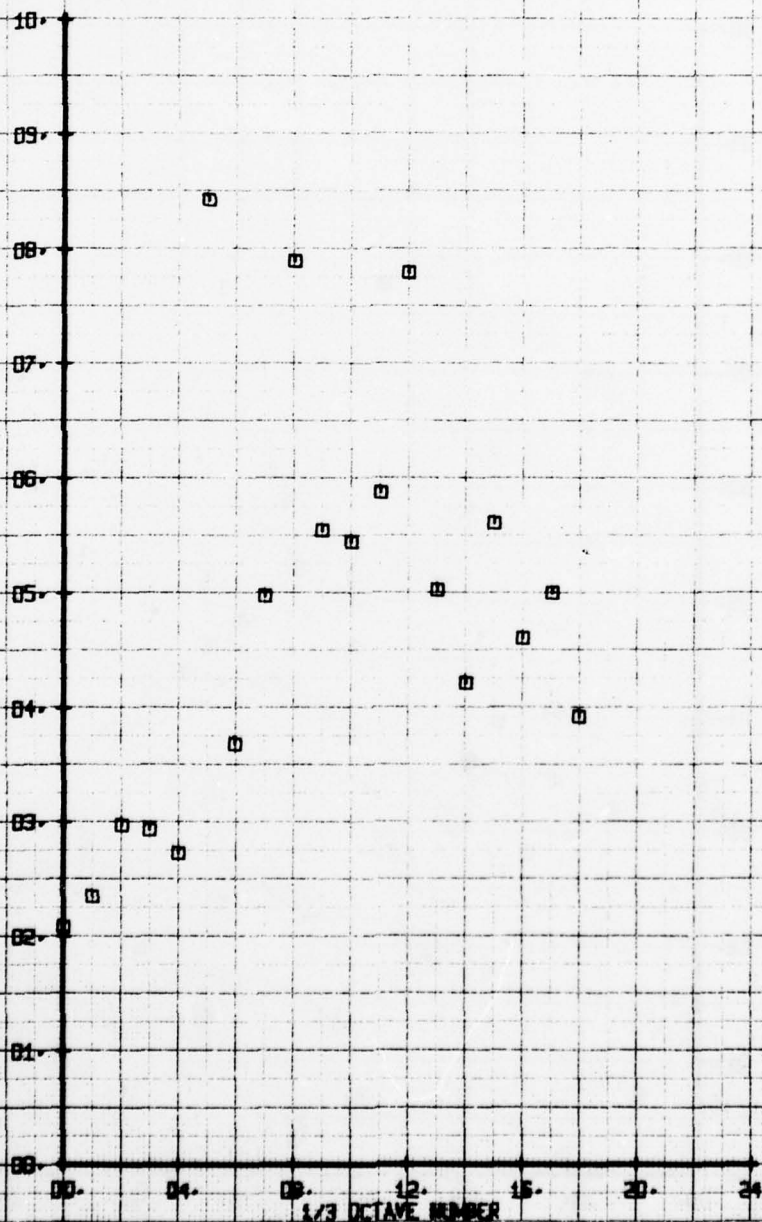
VELOCITY COMPONENT VEL-3RT FPS

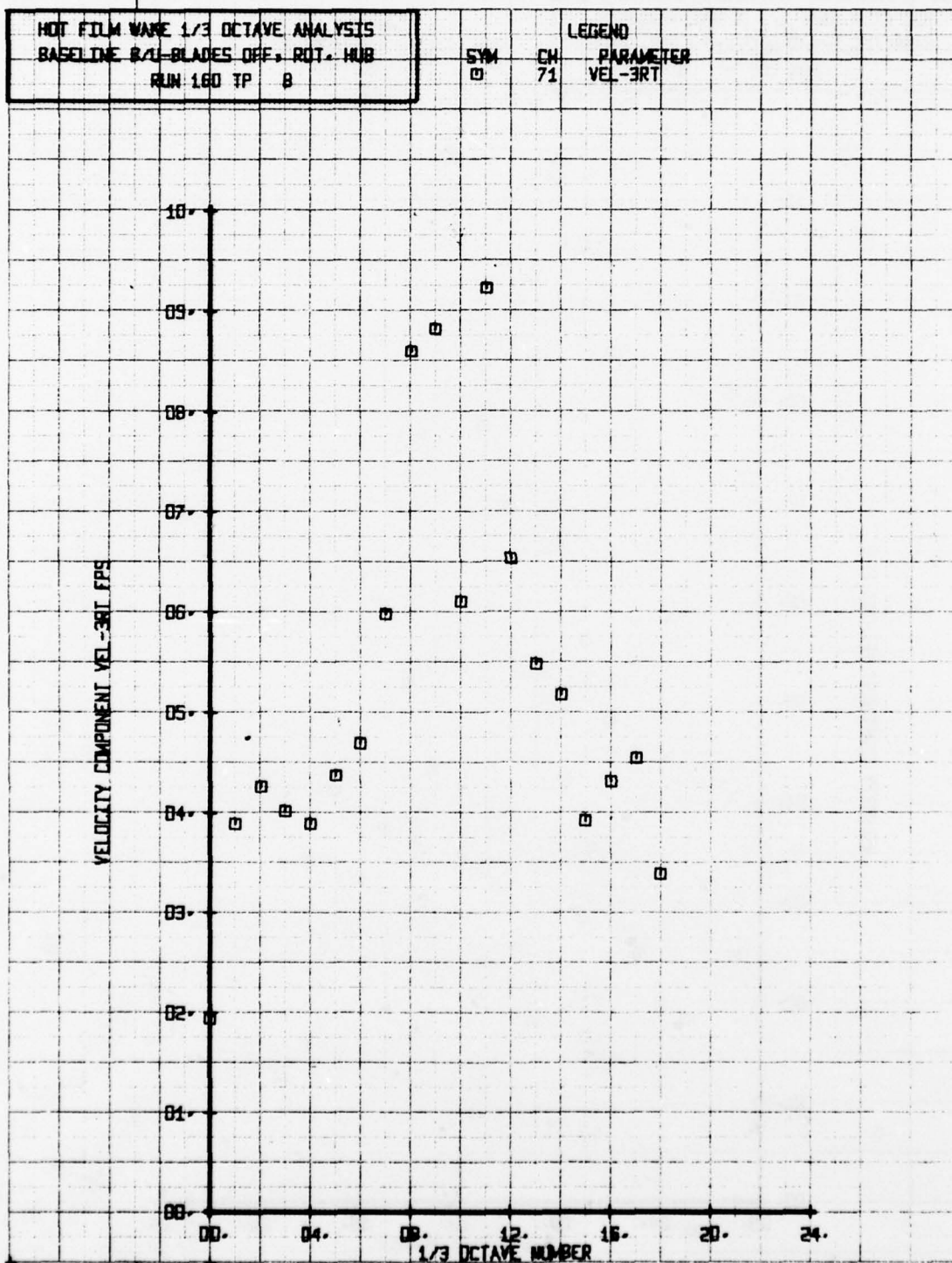


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-BLADES OFF, RQT. HUB  
 RUN 160 TP 7

LEGEND  
 CH: 71  
 PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS







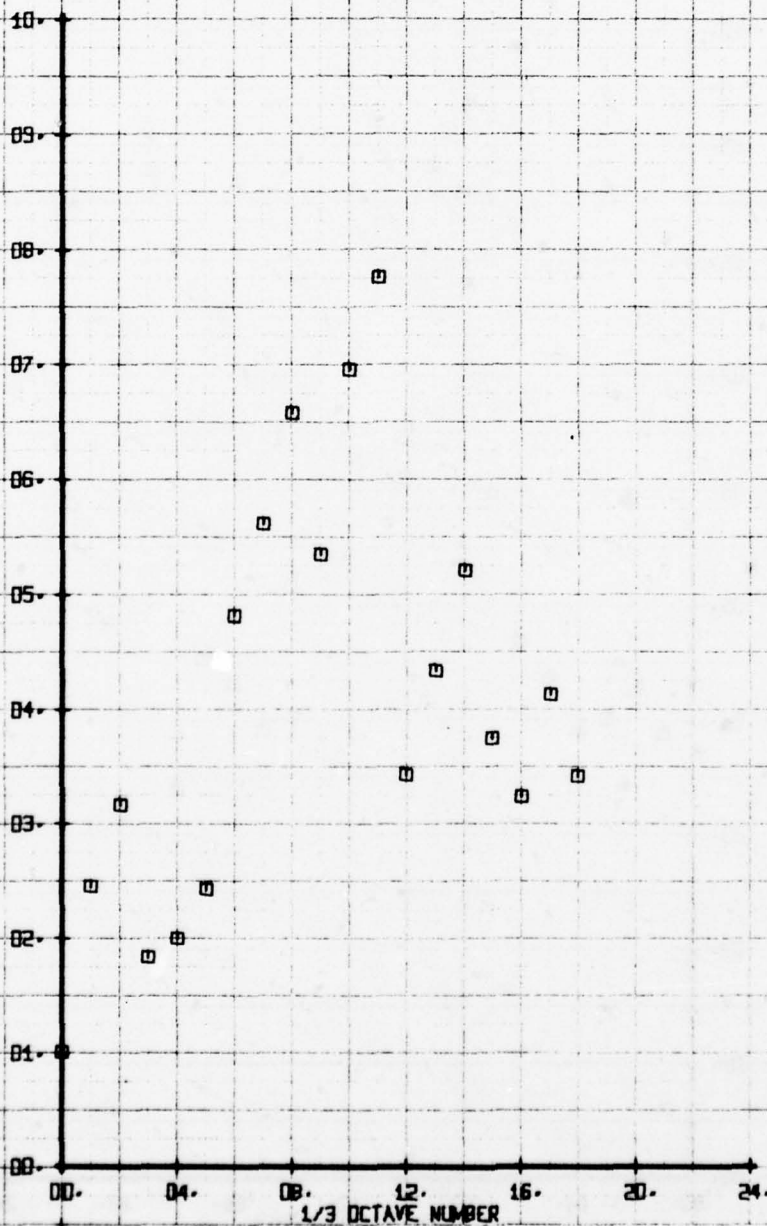
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/1-BLADES OFF, ROT. HUB  
 RUN 160 TP 9

SYM  
 □

CH  
 71

LEGEND  
 PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS

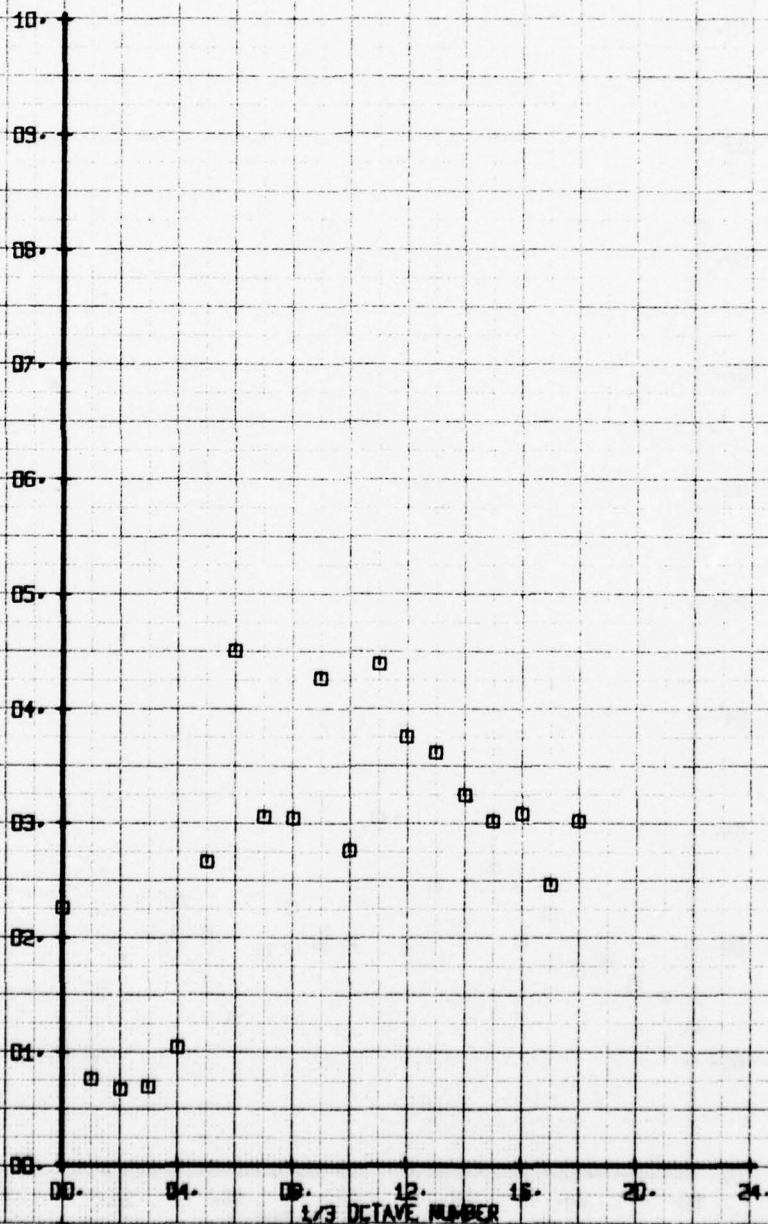


HOT FILM WARE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/1-BLADES OFF, ROT. HUB  
 RUN 160 TP 10

SYM  
 □

LEGEND  
 CH: 71  
 PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



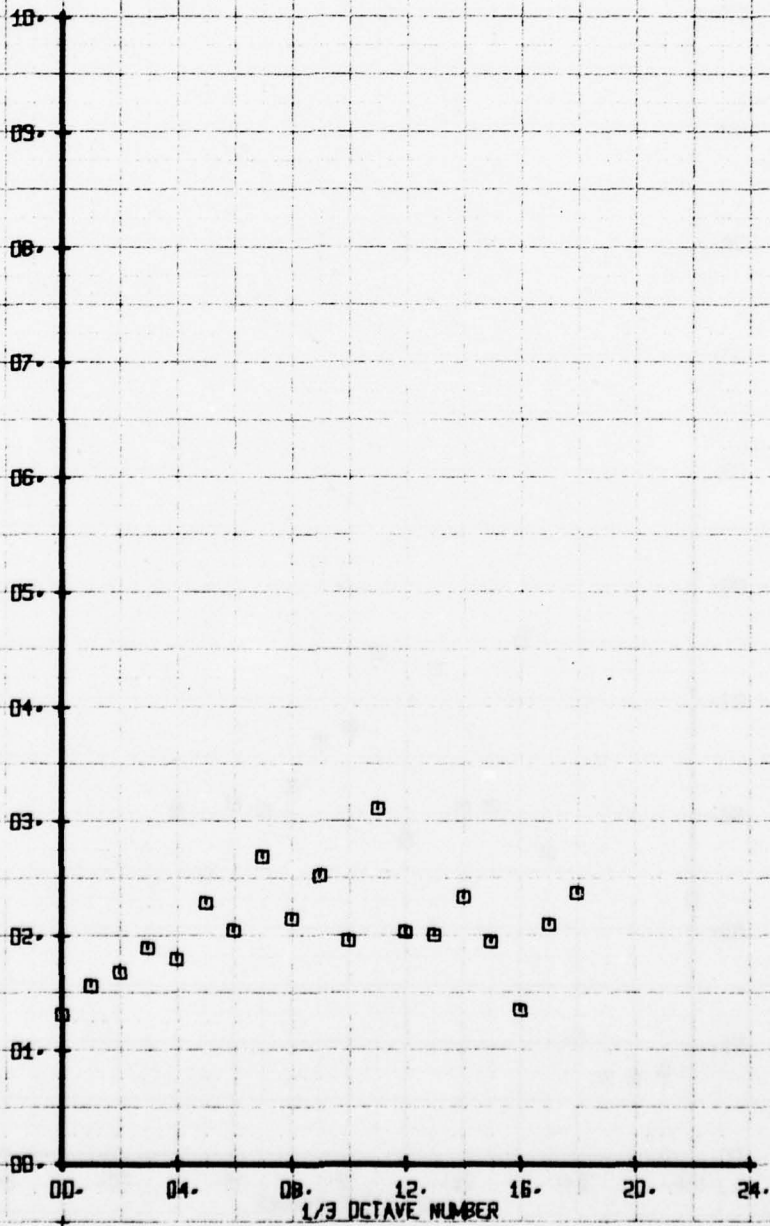
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, ROT. HUB  
 RUN 160 TP 11

SYM  
 □

CH  
 71

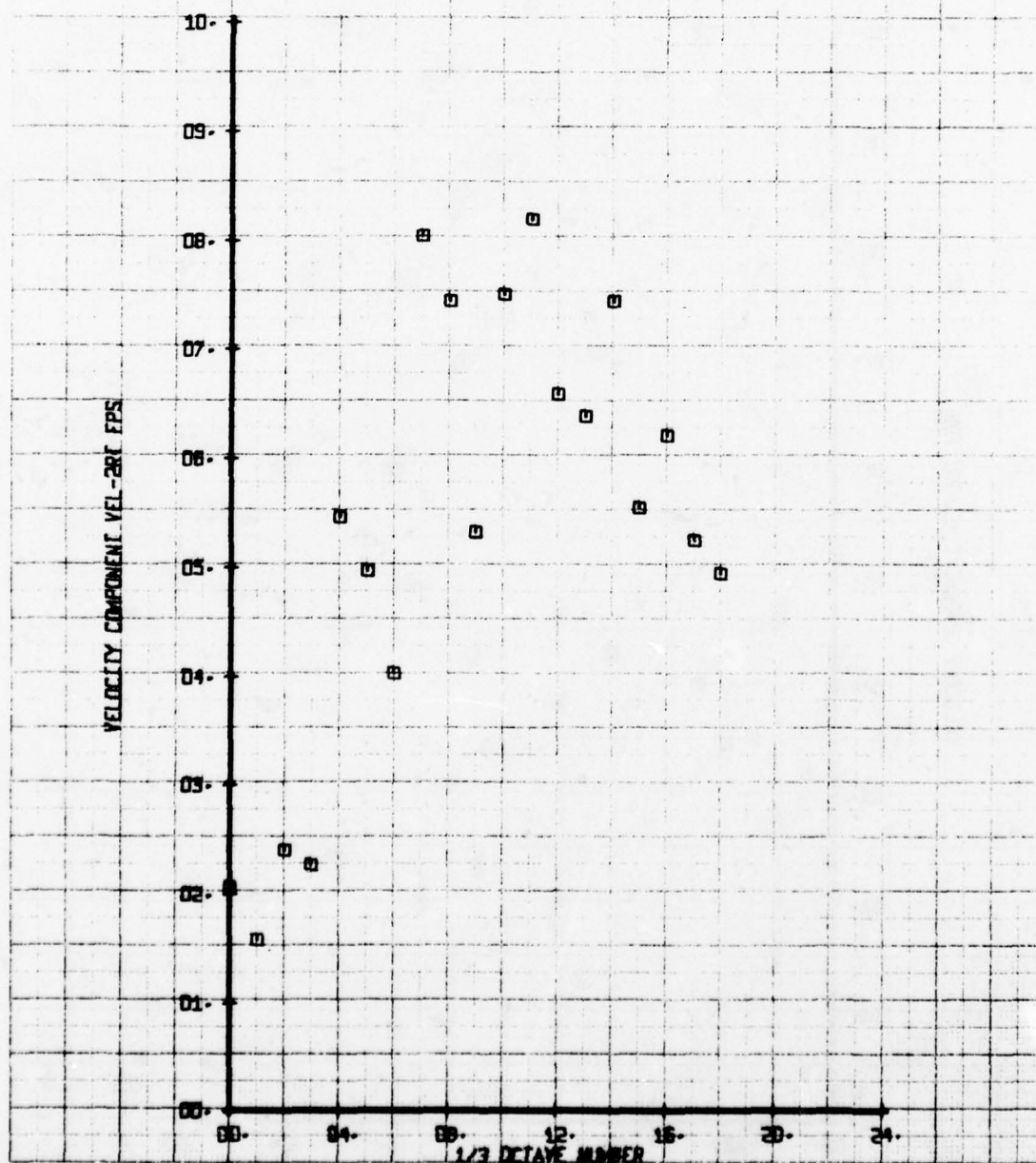
LEGEND  
 PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, ROT- HUB  
 RUN 180 TP 5

SYN EH PARAMETER  
 0 75 VEL-2RT



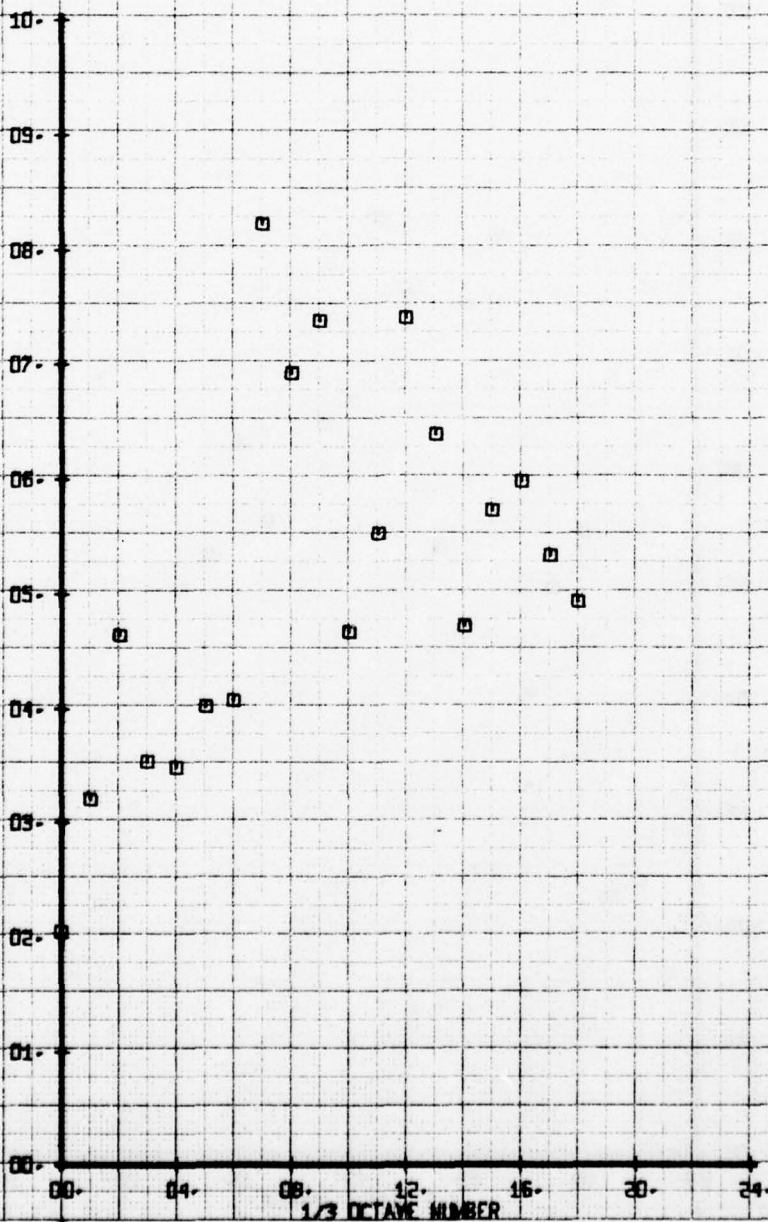


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE B/U-BLADES OFF, ROT-HUB  
RUN 180 TP 6

SYM  
□

LEGEND  
CH 75  
PARAMETER  
VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS

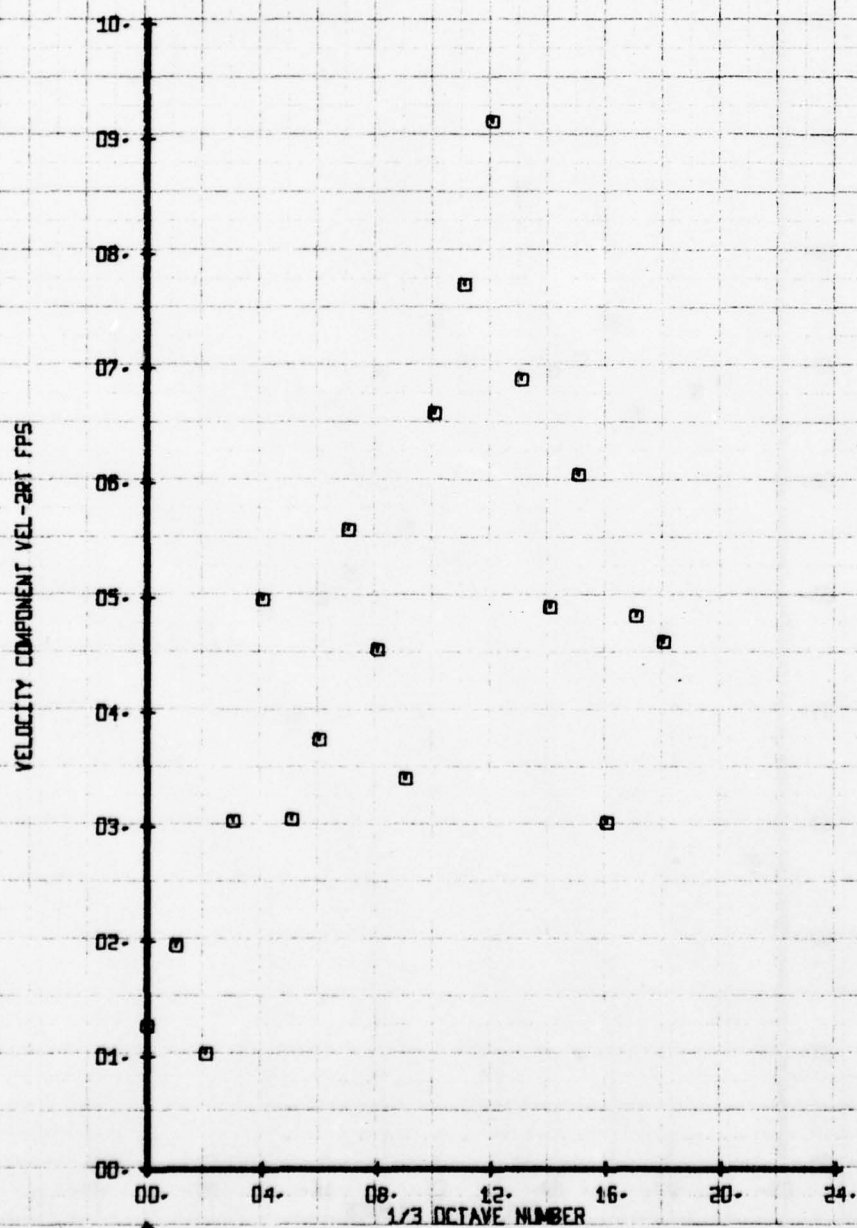


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, ROT- HUB  
 RUN 160 TP 7

SYM  
 0

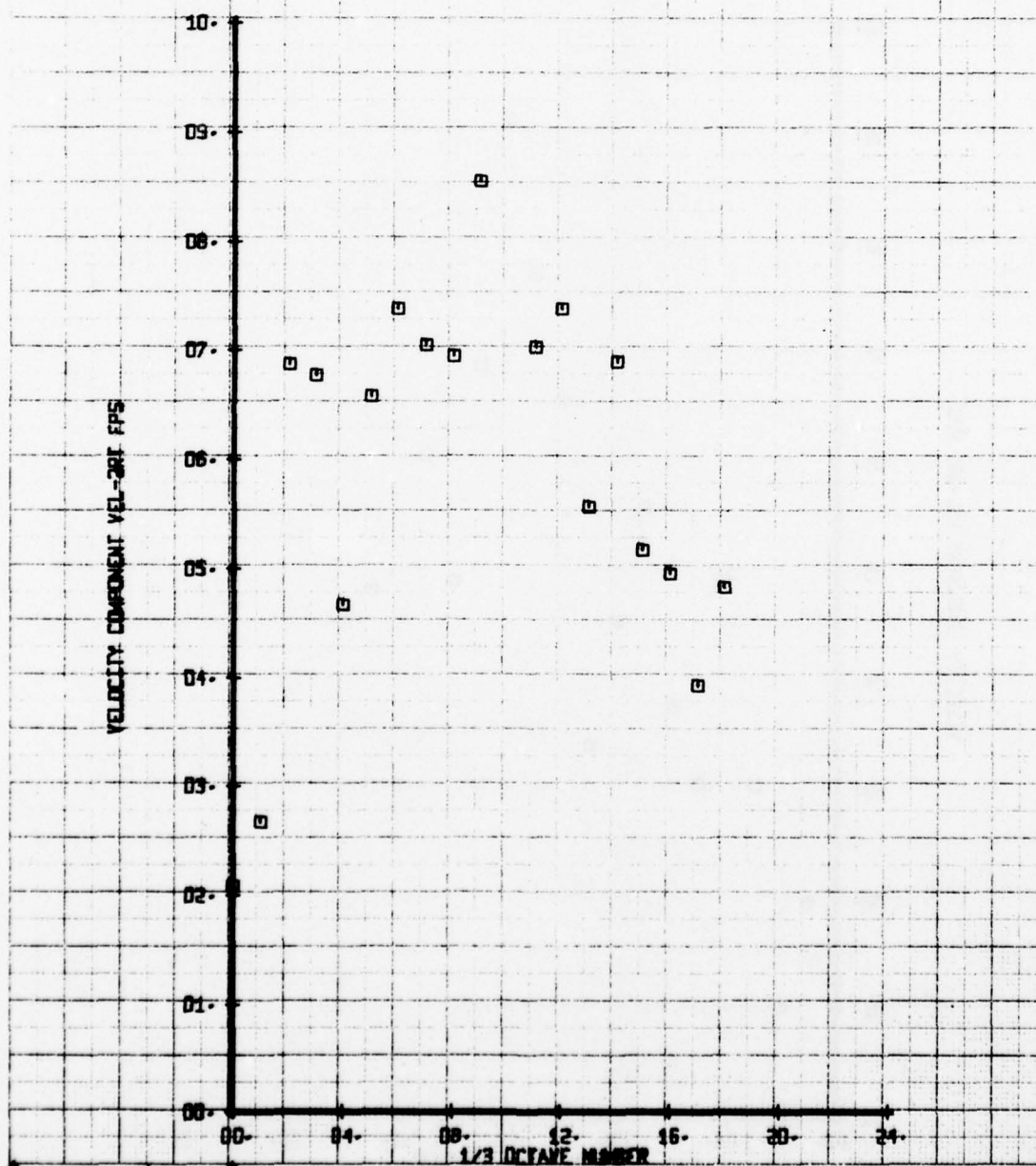
CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE B/U-BLADGES OFF, ROT- HUB  
RUN 160 TP 8

SYM CH PARAMETER  
□ 75 VEL-2RT



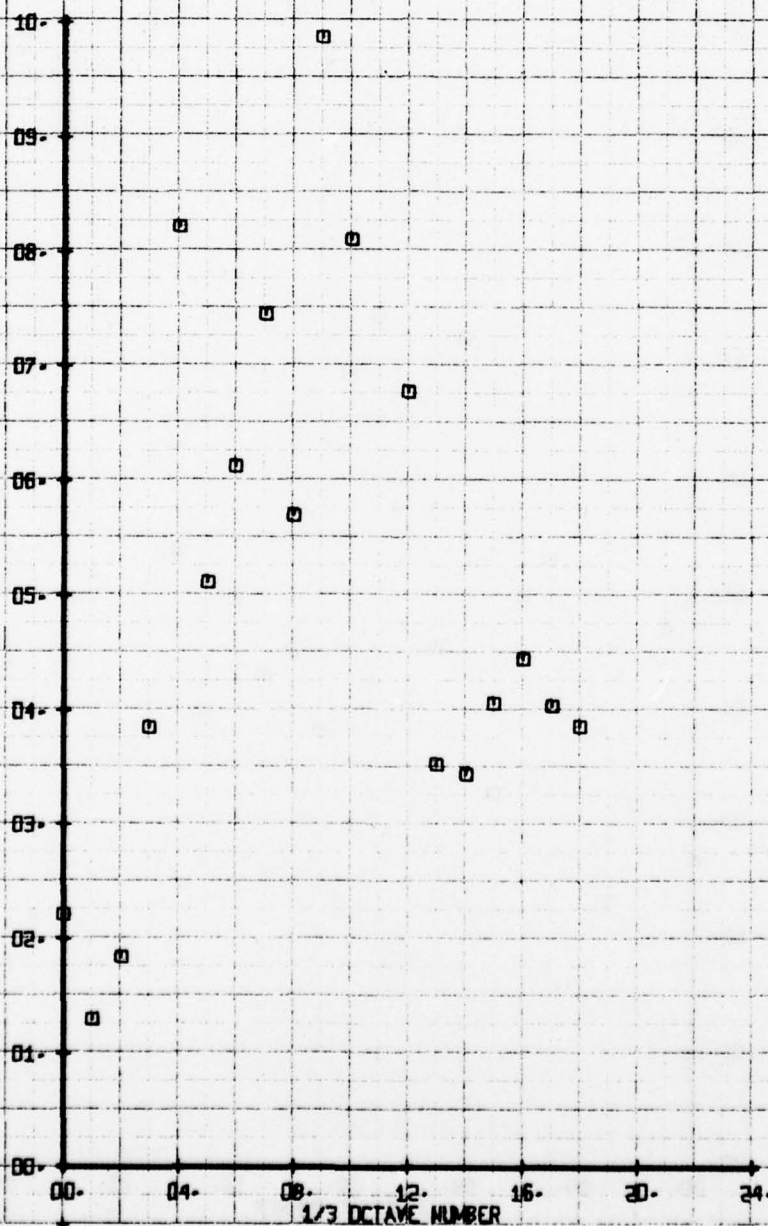
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE B/L-BLADES OFF, ROT-MUB  
RUN 160 TP B

SYM  
□

CH  
75

LEGEND  
PARAMETER  
VEL-2RT

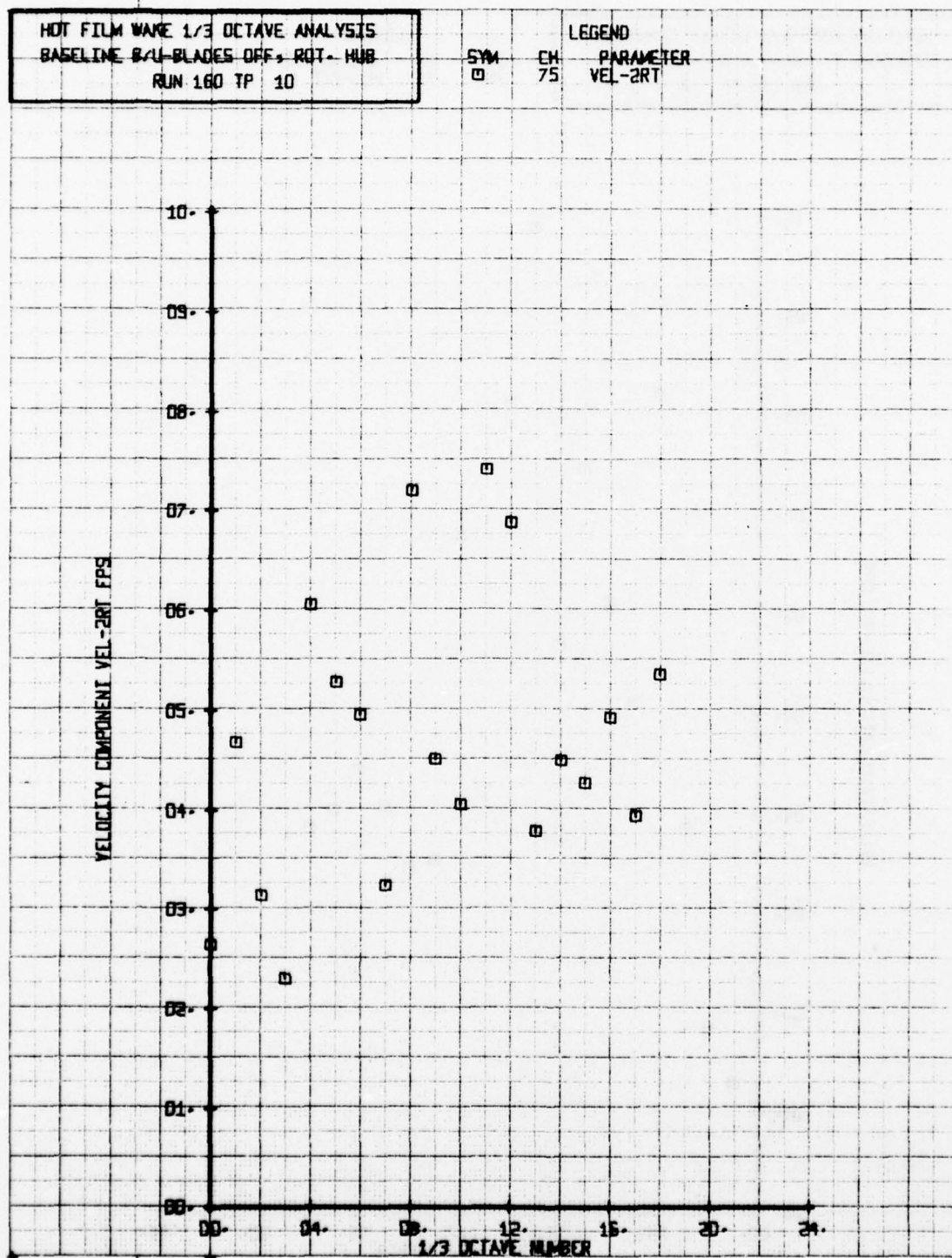
VELOCITY COMPONENT VEL-2RT FPS





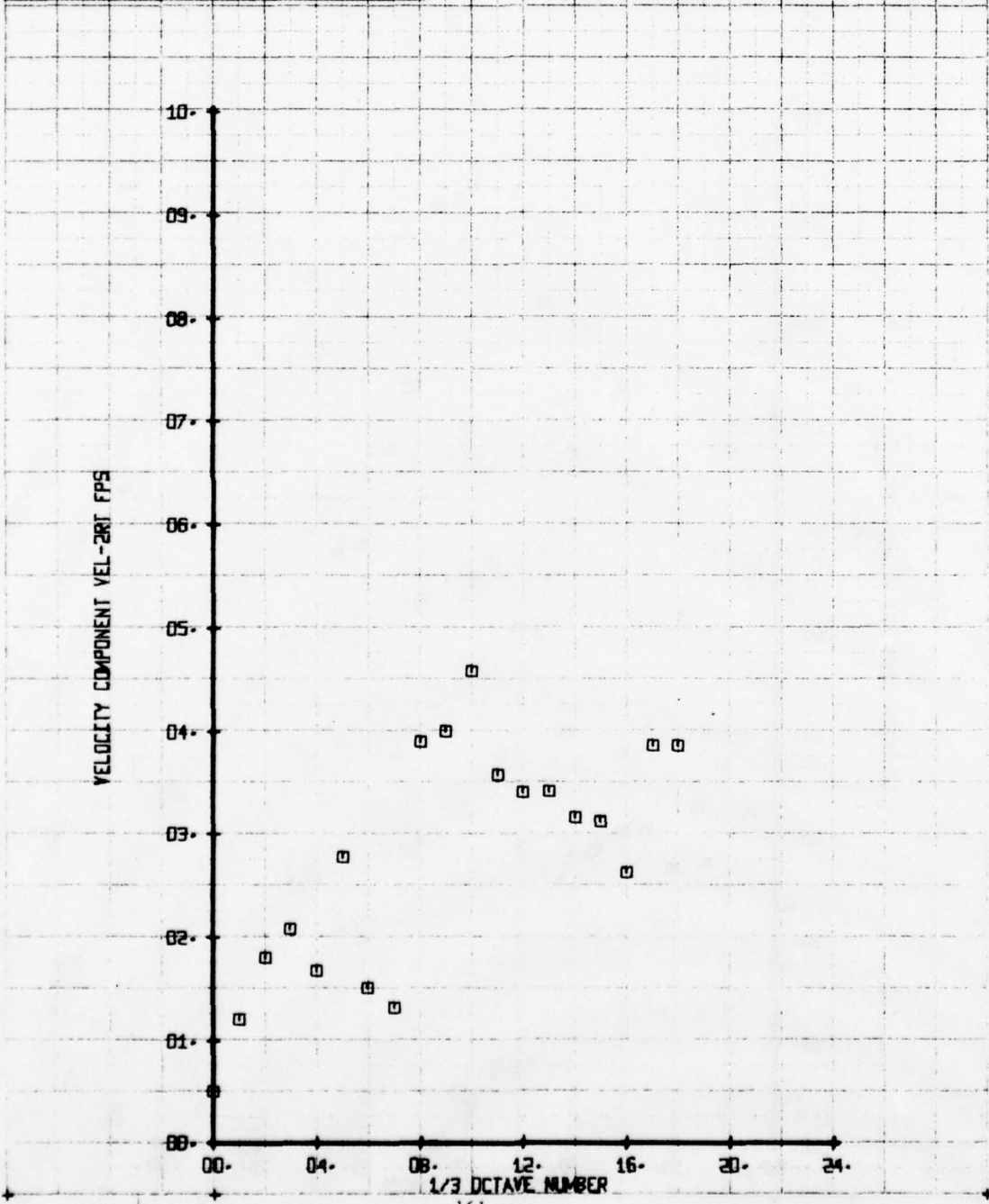
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE S/U-BLADES OFF, ROT-HUB  
 RUN 160 TP 10

SYM	CH	PARAMETER
□	75	VEL-2RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/U-BLADES OFF, ROT-HUB  
 RUN 160 TP 11

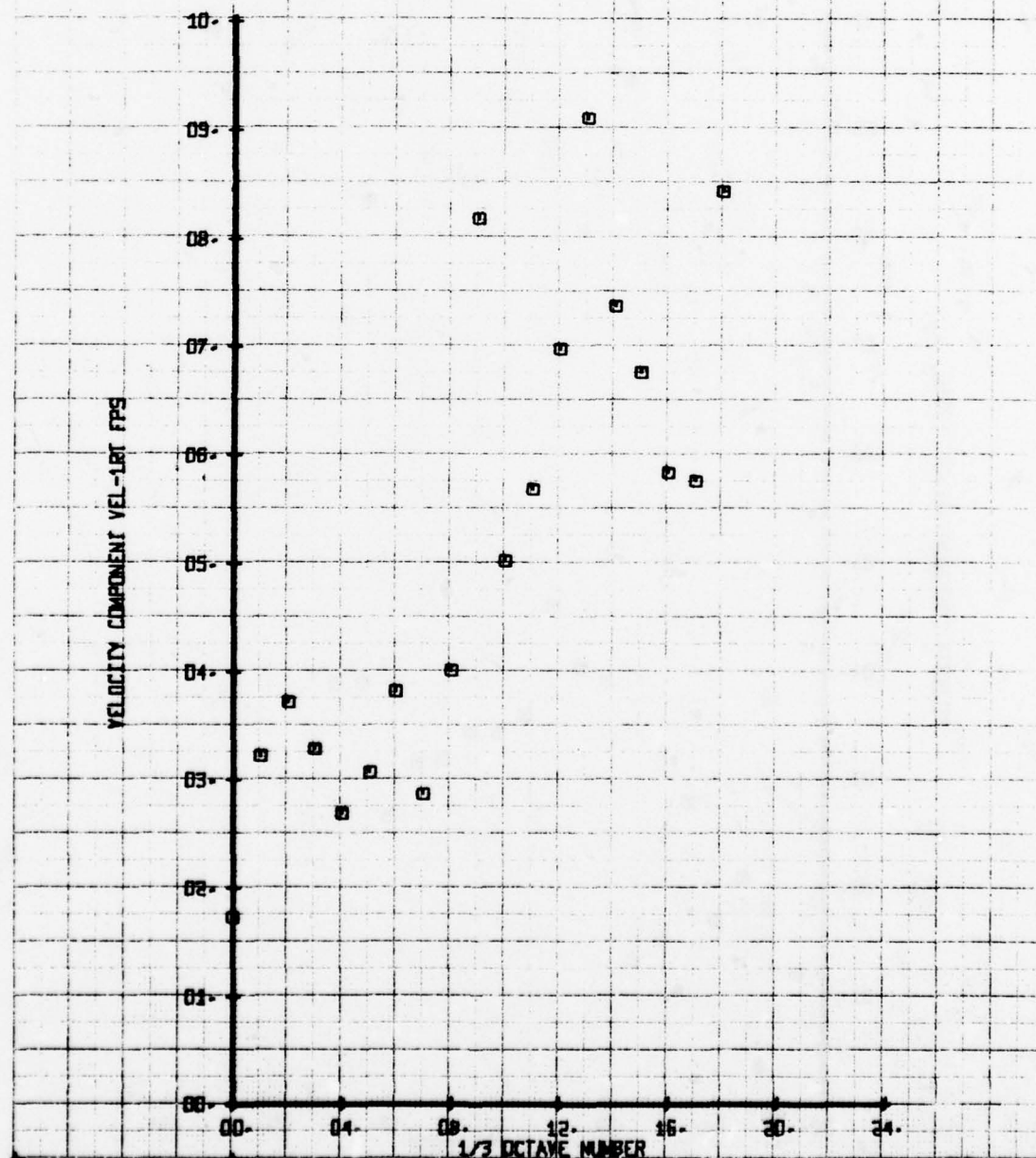
SYM	CH	LEGEND
□	75	PARAMETER
		VEL-2RT

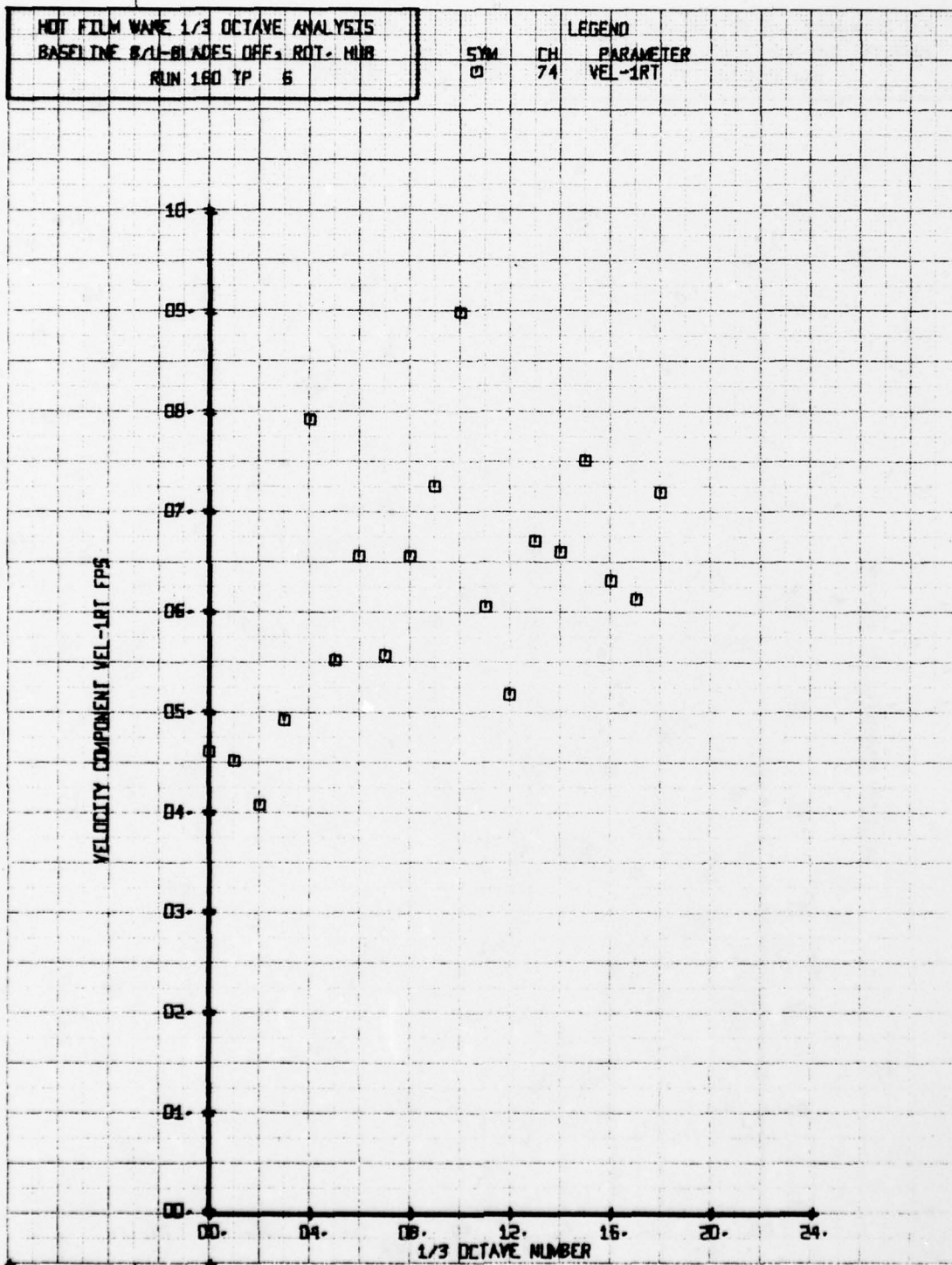


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/4-BLADES OFF, ROT. HUB  
 RUN 160 TP 5

LEGEND  
 SYM CH PARAMETER  
 □ 74 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS

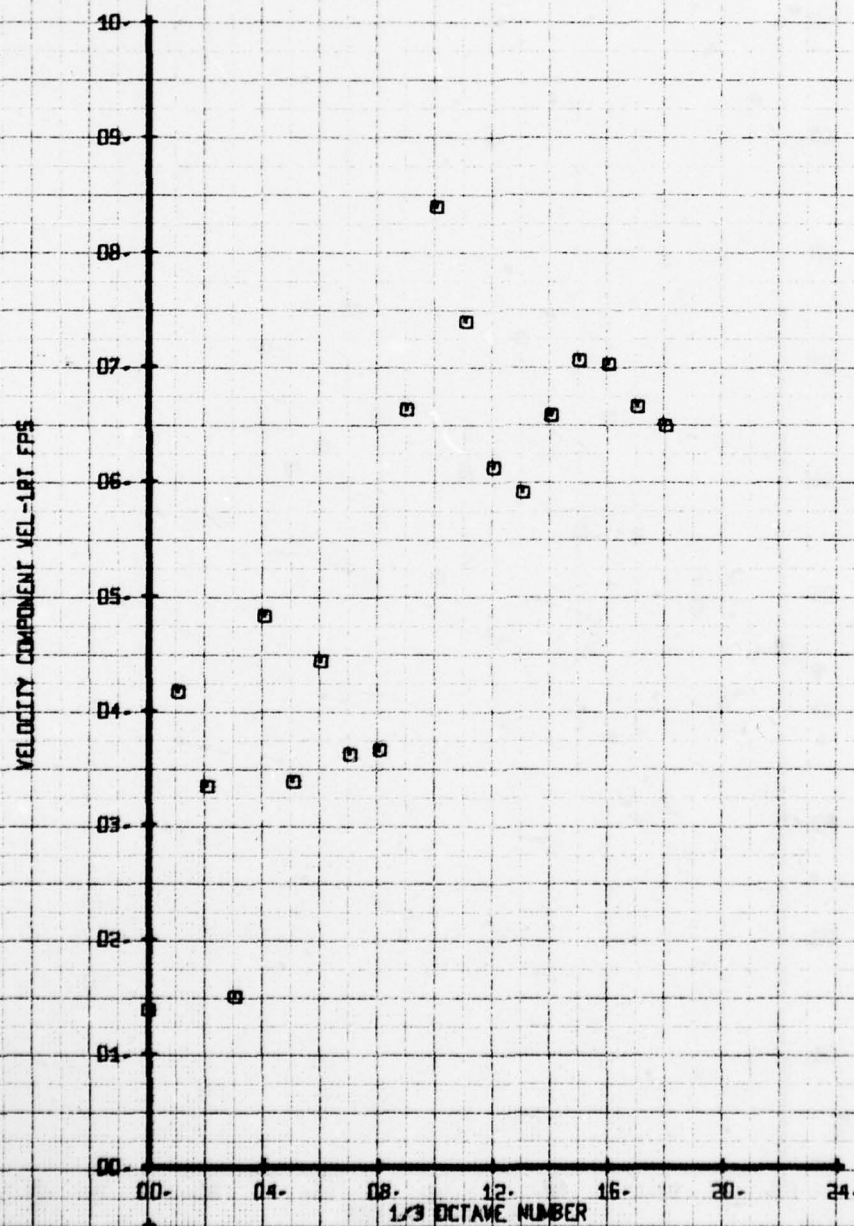






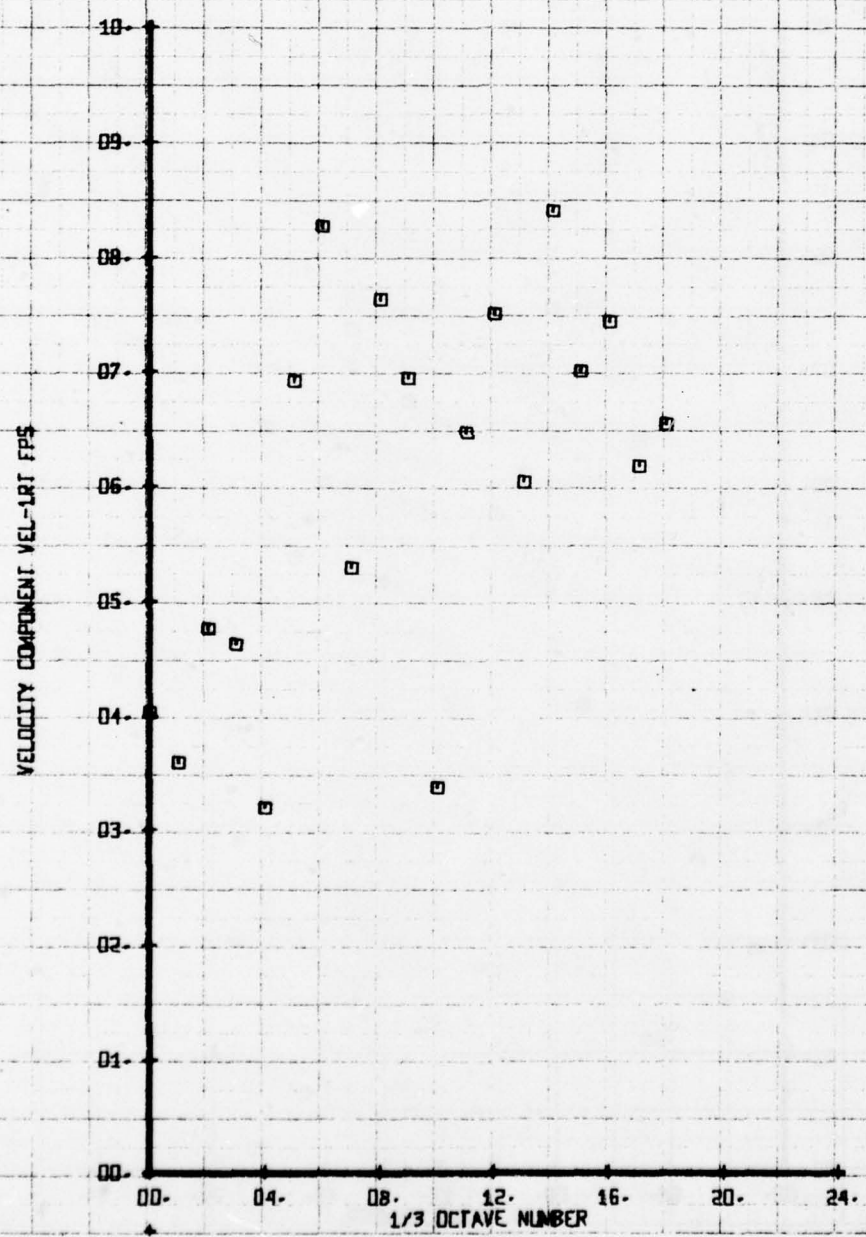
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, RDT- MMB  
 RUN 160 TP 7

SYM	CH	PARAMETER
□	74	VEL-1RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/D-BLADES OFF, ROT. HUB  
 RUN 160 TP 8

SYM	CH	PARAMETER
□	74	VEL-1RT



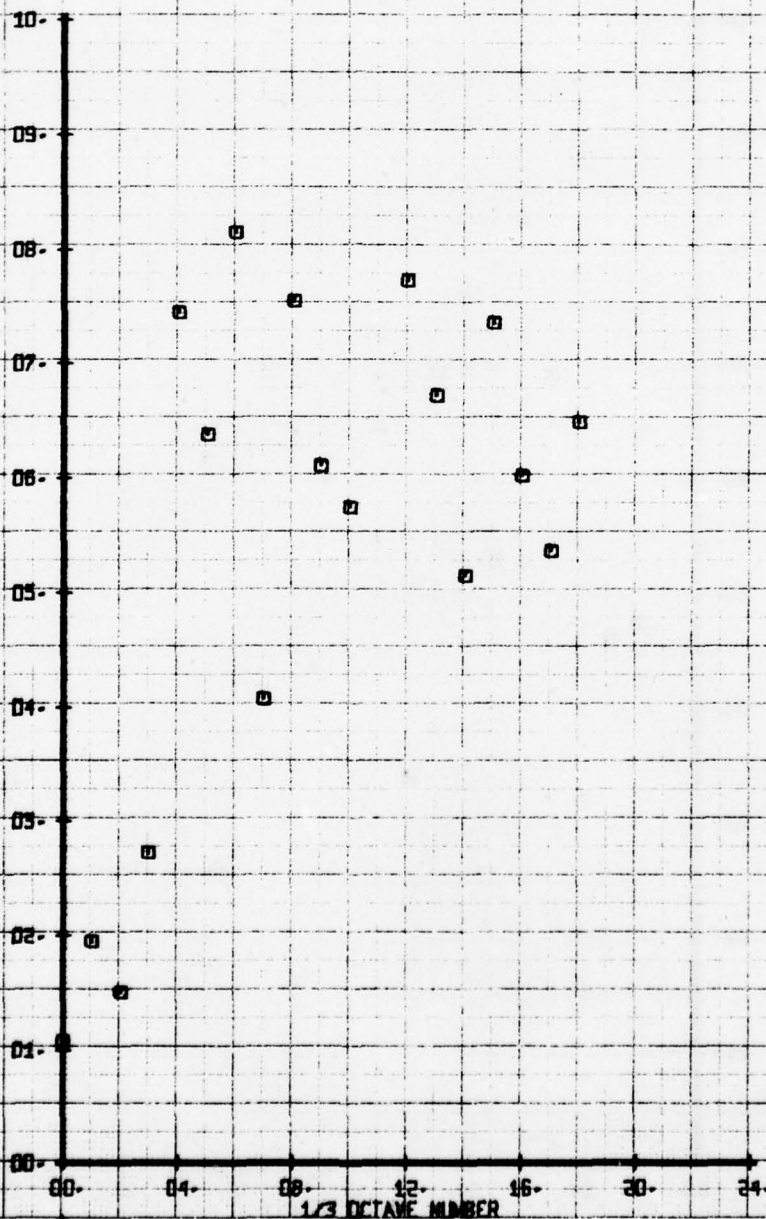
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/4-BLADES OFF, ROT- HUB  
 RUN 160 TP 9

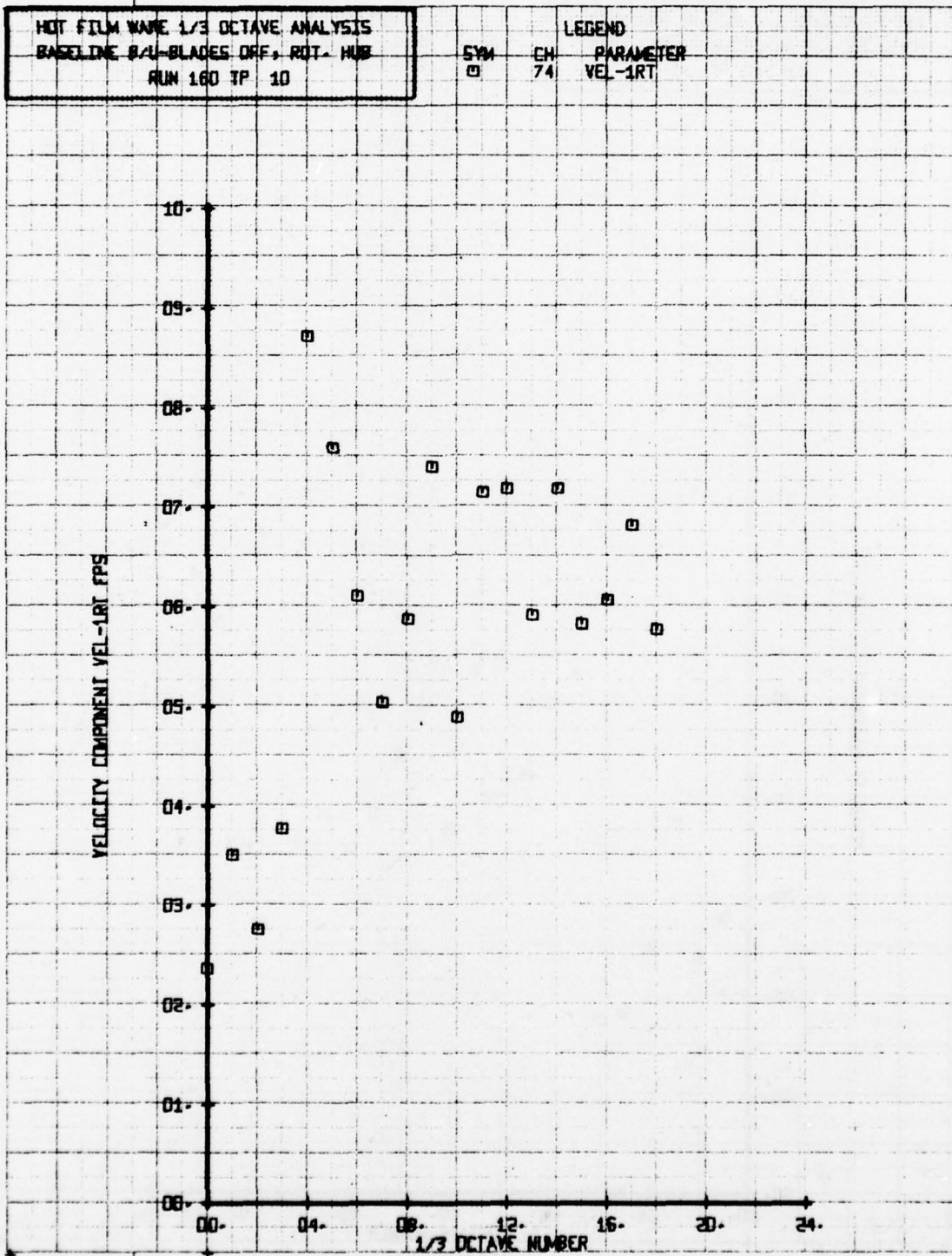
SYM  
 □

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS

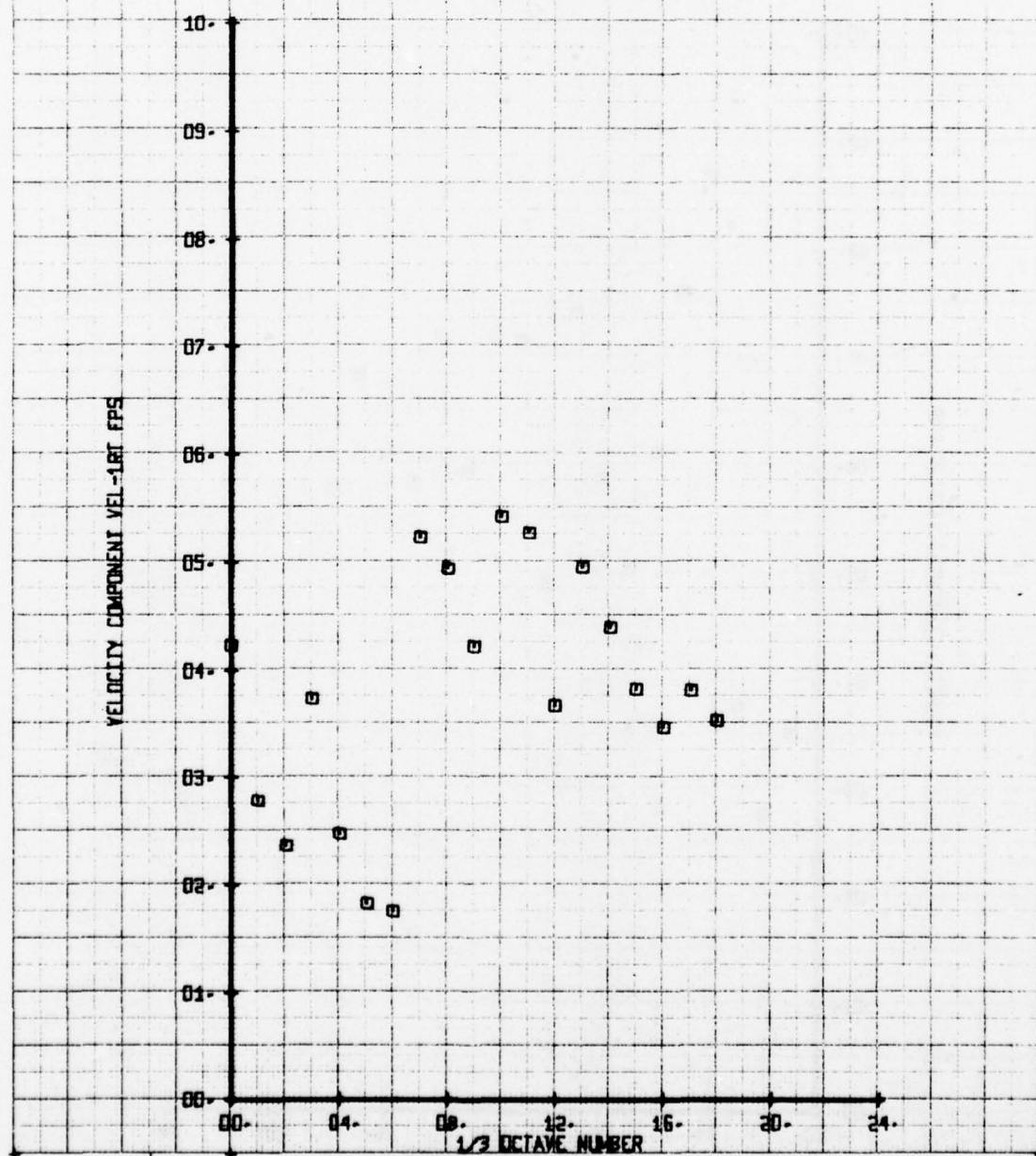






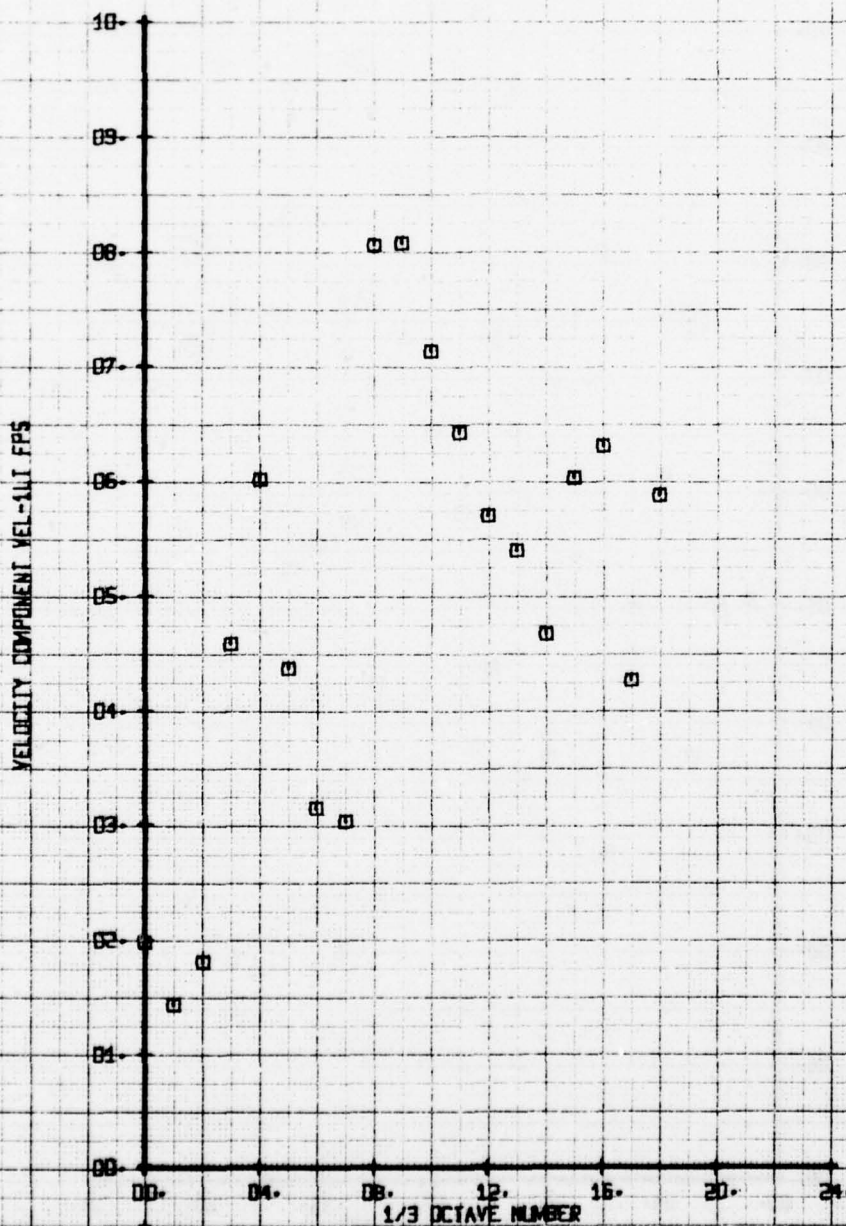
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE 8/4-BLADES OFF, ROT. HUB  
RUN 160 TP 11

LEGEND  
SYM CH PARAMETER  
□ 74 VEL-1RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, ROT. HUB  
 RUN 160 TP 6

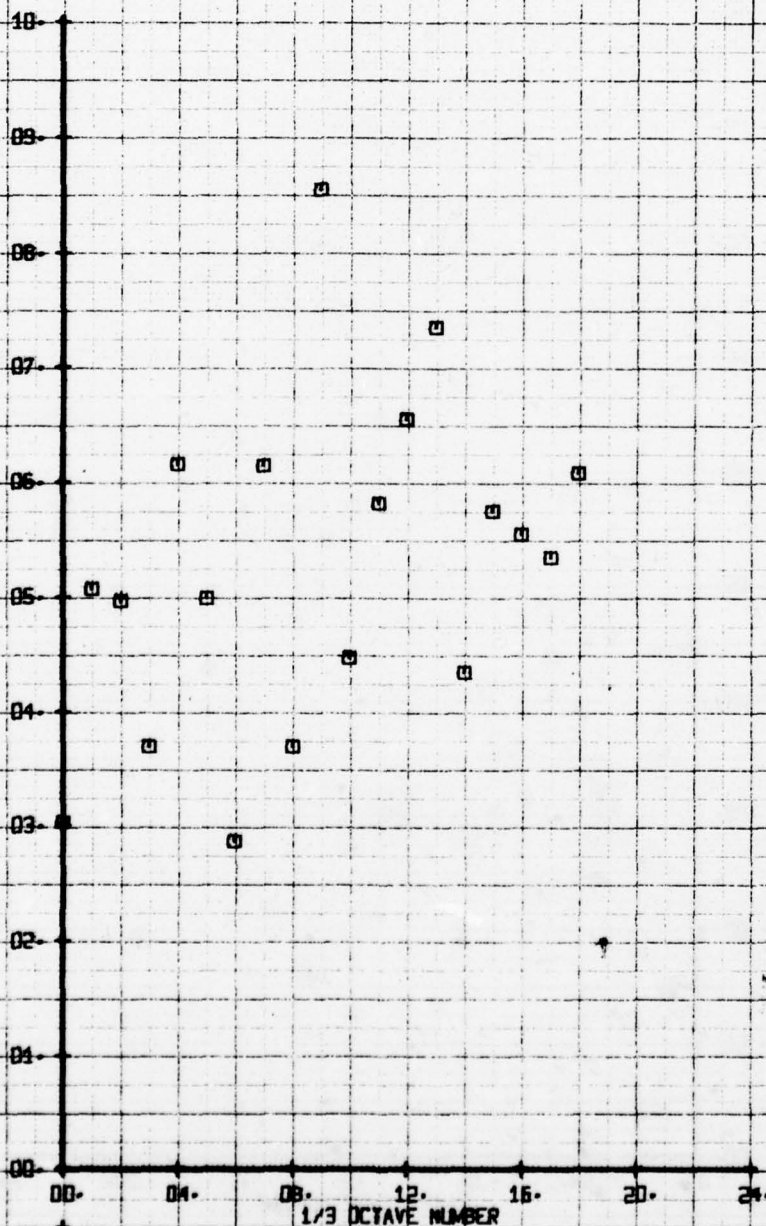
LEGEND  
 SYM CH PARAMETER  
 □ 73 VEL-1LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/11-BLADES OFF, ROT. HUB  
 RUN 160 TP 7

SYM	CH	PARAMETER
□	73	VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



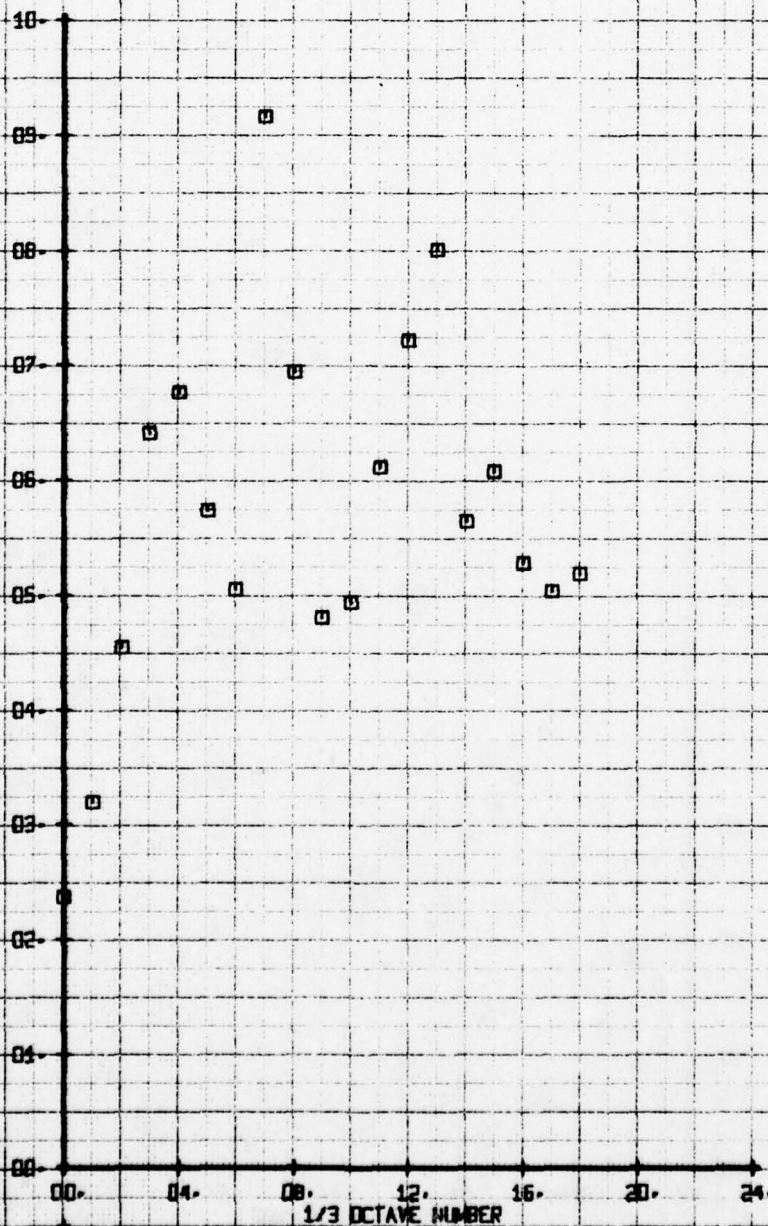
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/L-BLADES OFF, ROT. HUB  
 RUN 160 TP 8

SYM  
 □

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS

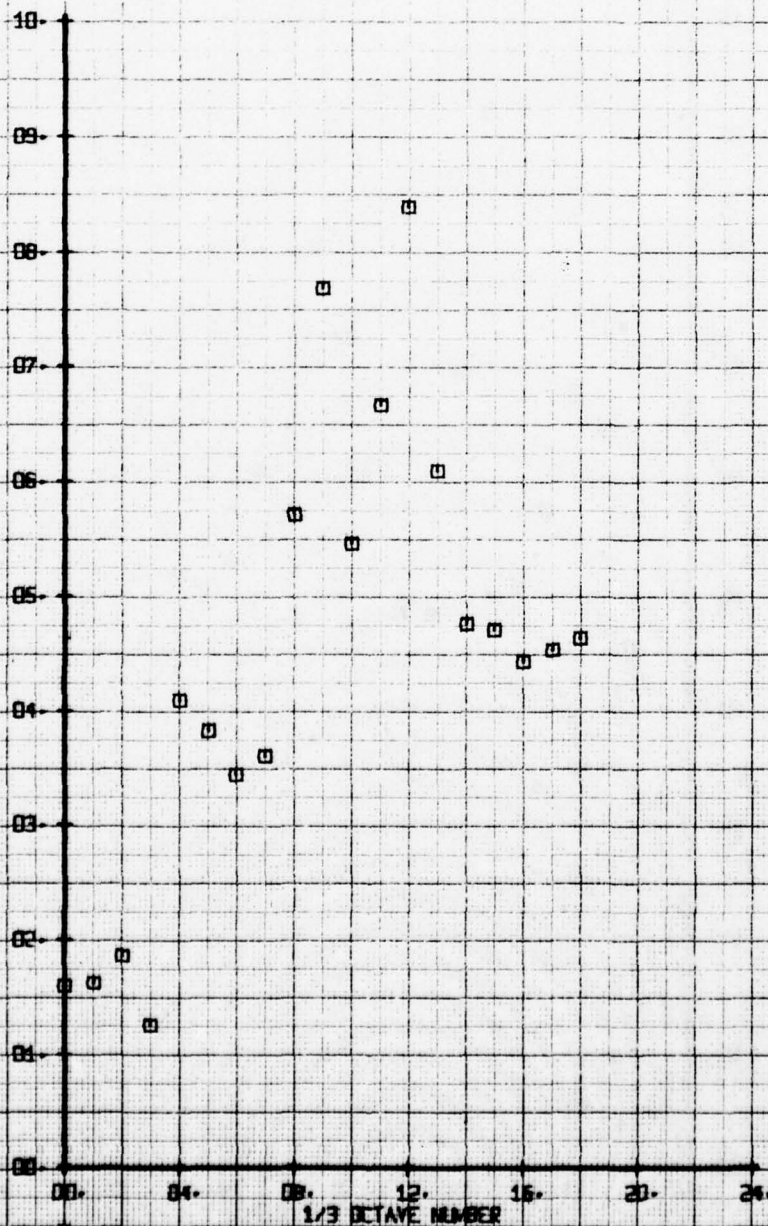




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/L-BLADES OFF, ROT-HUB  
 RUN 160 TP 9

SYM	CH	PARAMETER
□	73	VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS

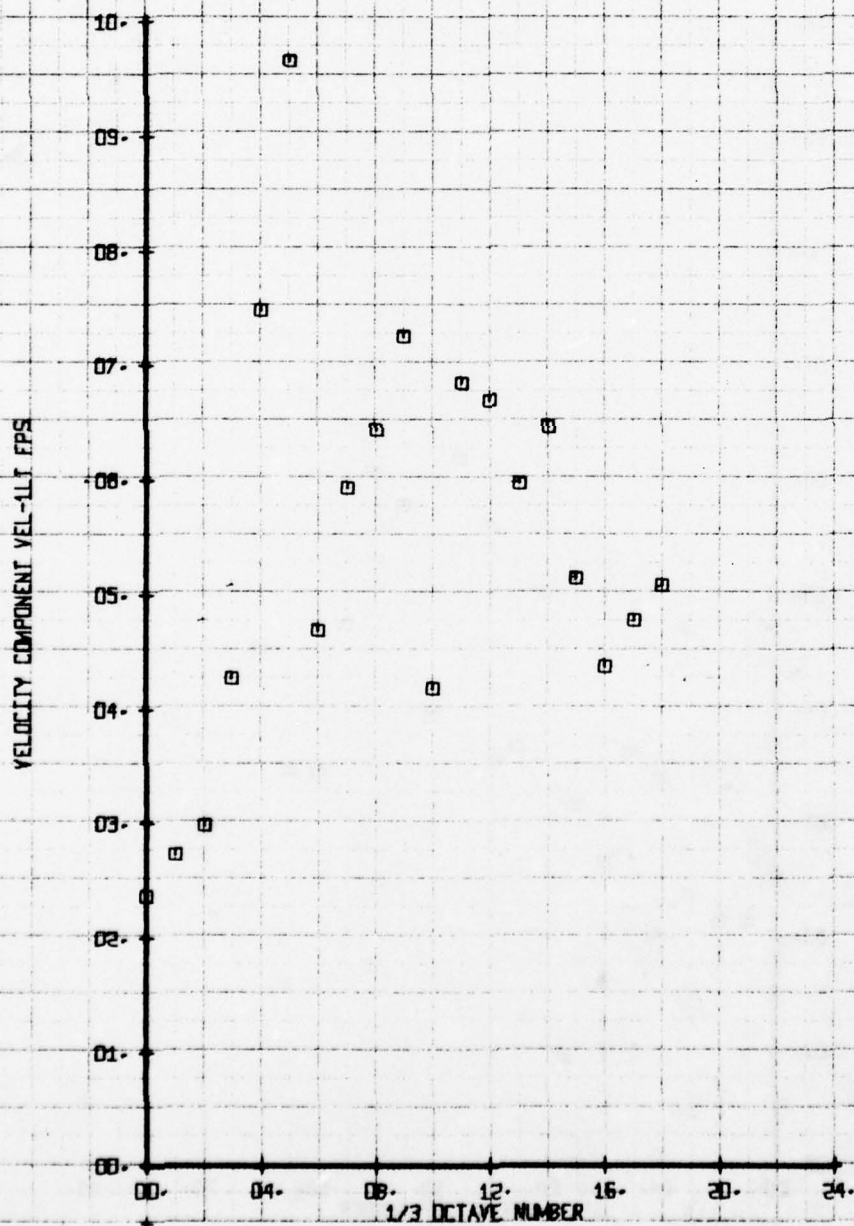


NOT FILM WAVE 1/3 OCTAVE ANALYSIS  
BASELINE 8/11 BLADES OFF, ROT- HUB  
RUN 160 TP 10

SYM  
□

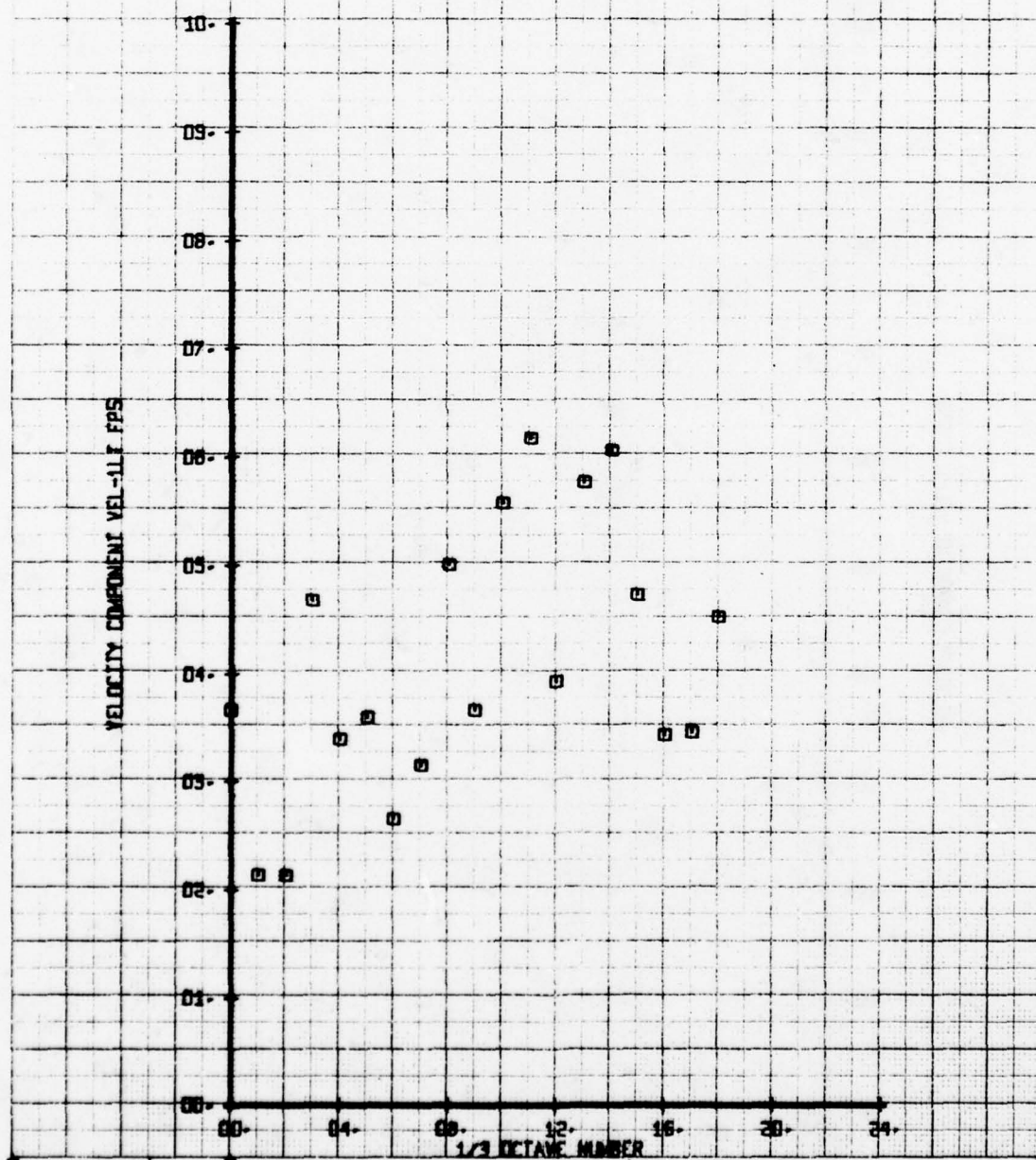
LEGEND

CH 73  
PARAMETER  
VEL-1LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES DRF, ROT, MUB  
 RUN 160 TP 11

SYN CH PARAMETER  
 0 73 VEL-1LT



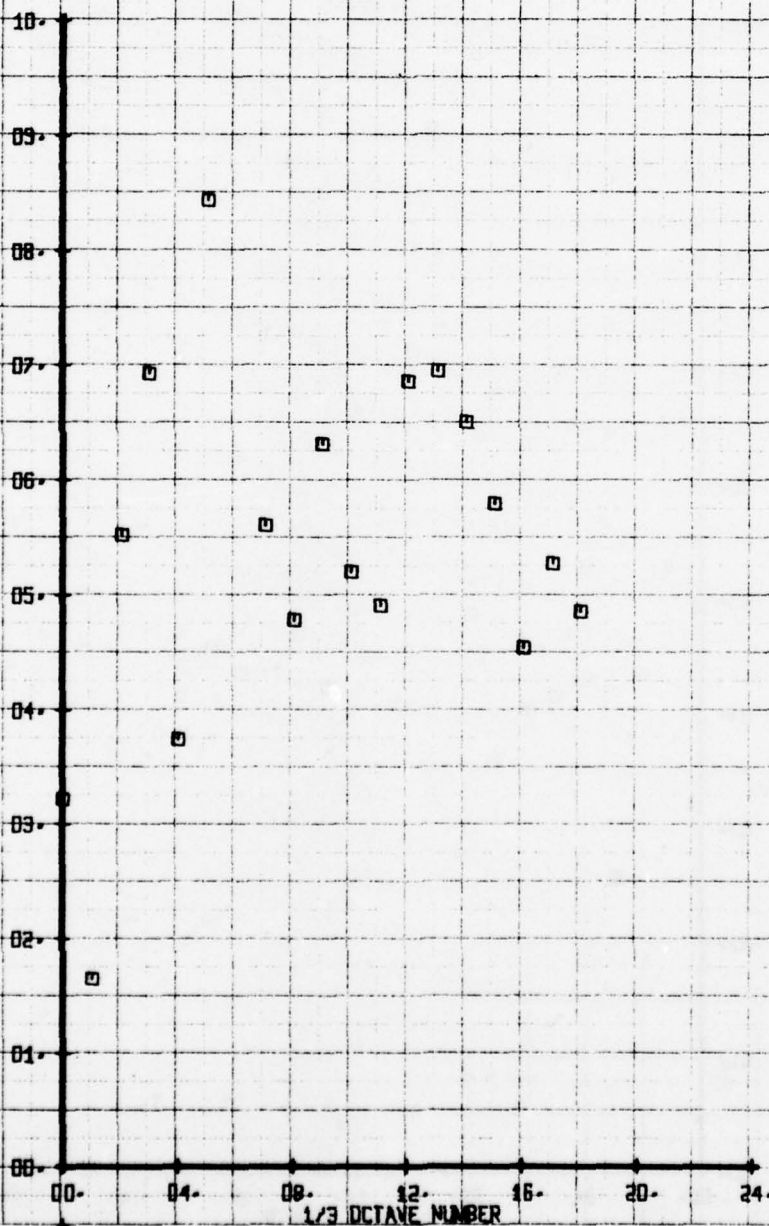
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, ROT. HUB  
 RUN 180 TP 5

SYM  
 □

LEGEND

CM 72  
 PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS





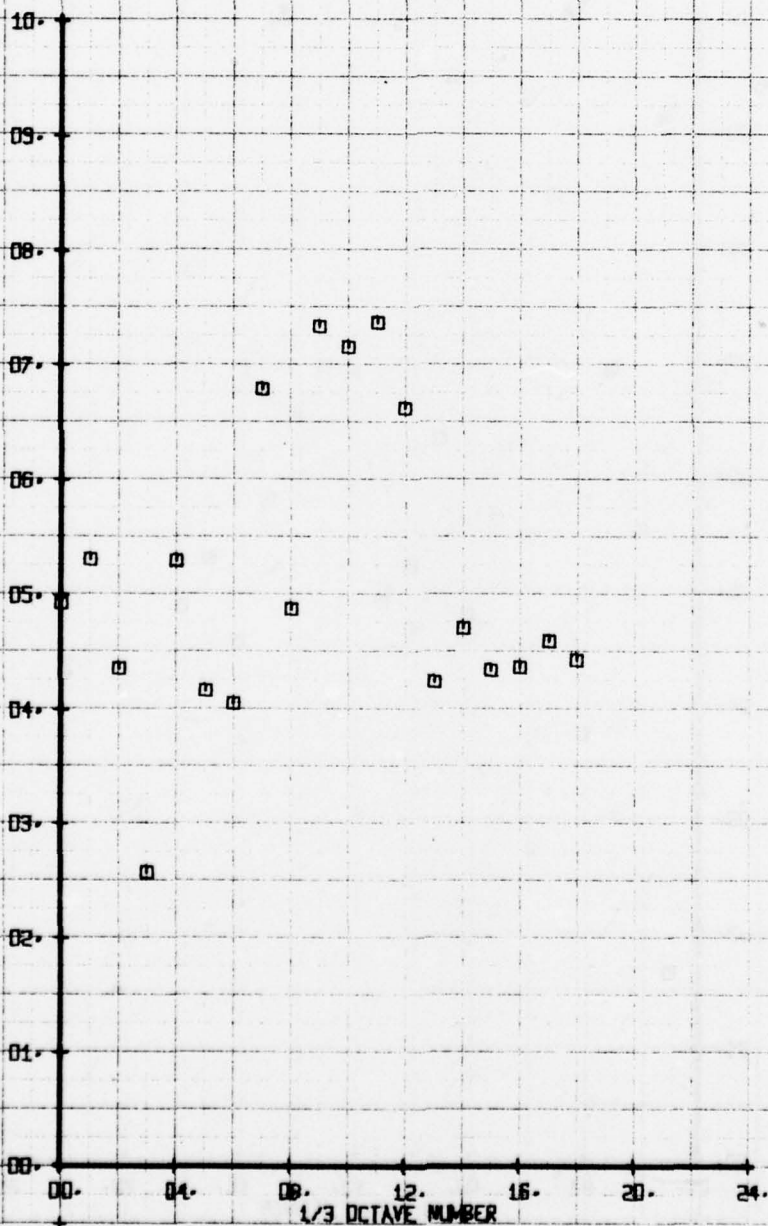
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE R/L-BLADES OFF, ROT. HUB  
RUN 180 TP 6

SYM  
□

CH  
72

LEGEND  
PARAMETER  
VEL-2LT

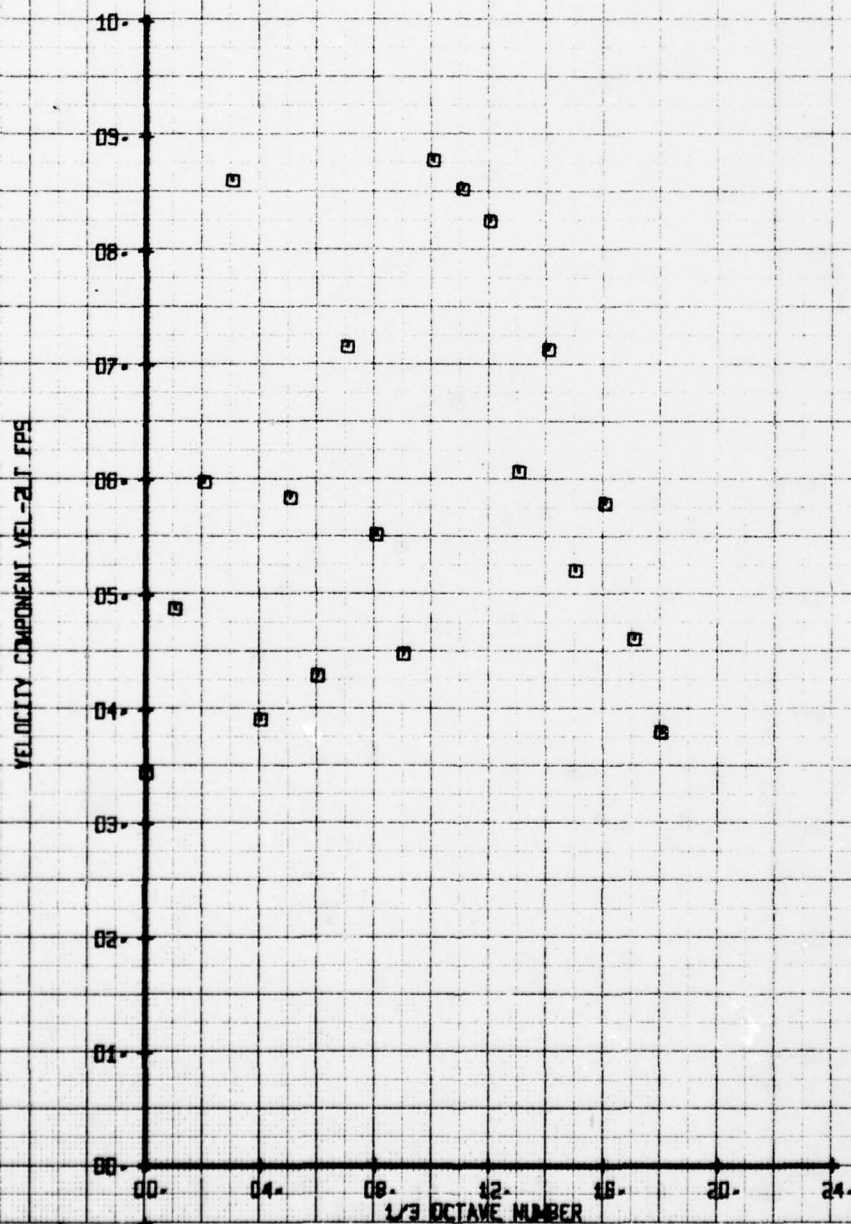
VELOCITY COMPONENT VEL-2LT EPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/U-BLADES OFF, ROT. HUB  
 RUN 180 TP 7

SYM  
 □

LEGEND  
 CH 72  
 PARAMETER  
 VEL-2LT



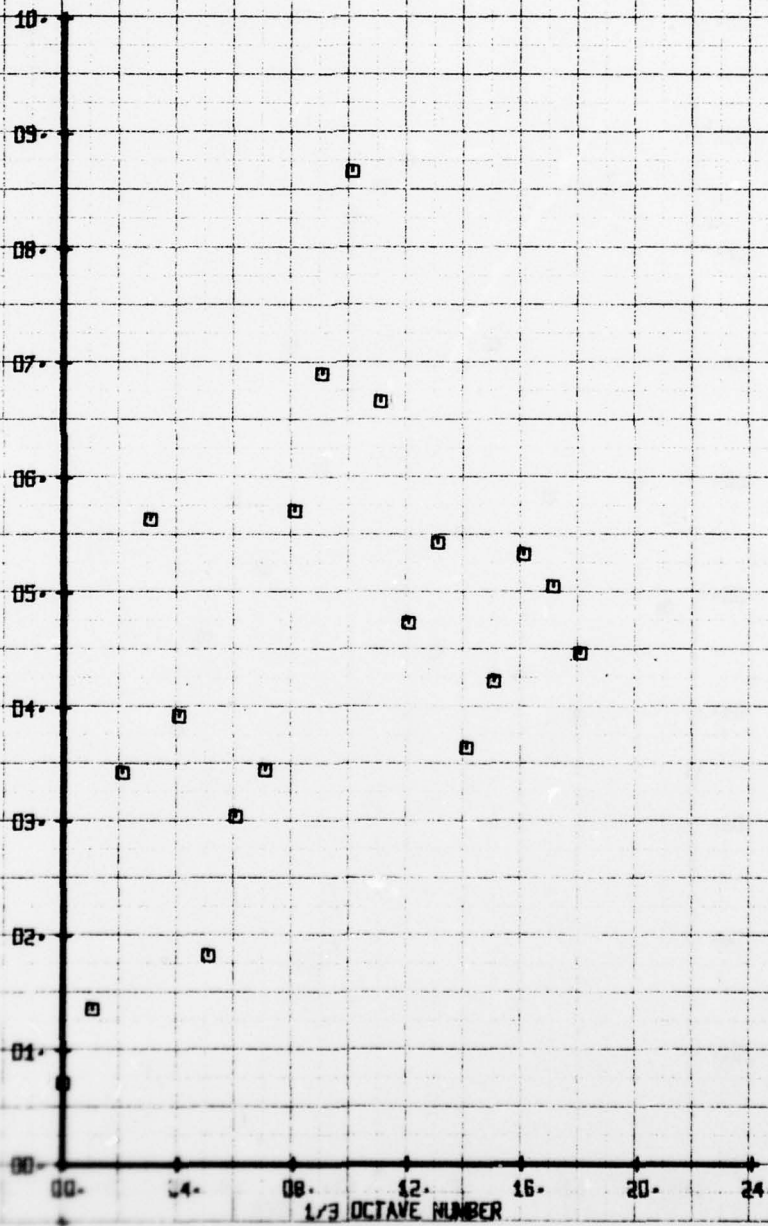
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/10-BLADES OFF, ROT. HUB  
 RUN 160 TP 8

SYM  
 □

CH  
 72

LEGEND  
 PARAMETER  
 VEL-ZLT

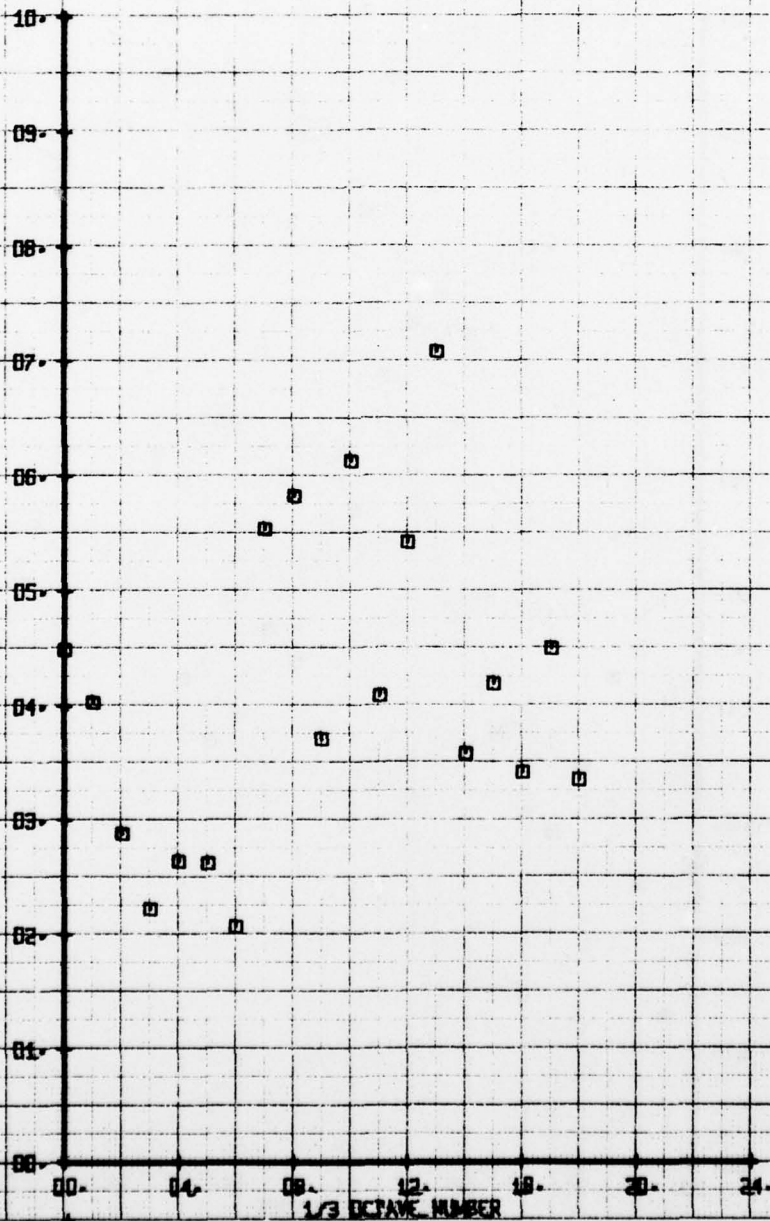
VELOCITY COMPONENT VEL-ZLT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/4-BLADES OFF, ROT, HOB  
 RUN 180 TP 9

SYM CH PARAMETER  
 □ 72 VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS

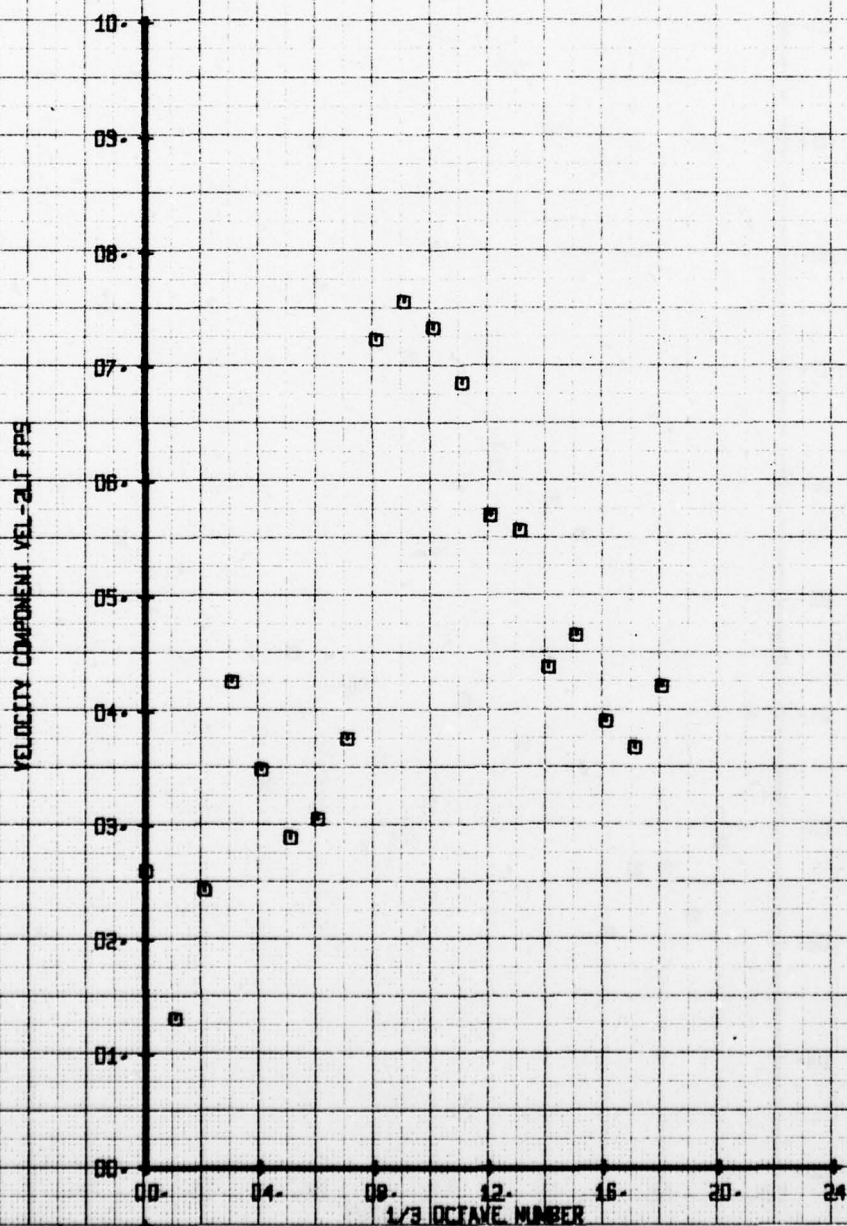




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE B/U-BLADES OFF, ROT. HUB  
RUN 160 TP 10

SYM  
□

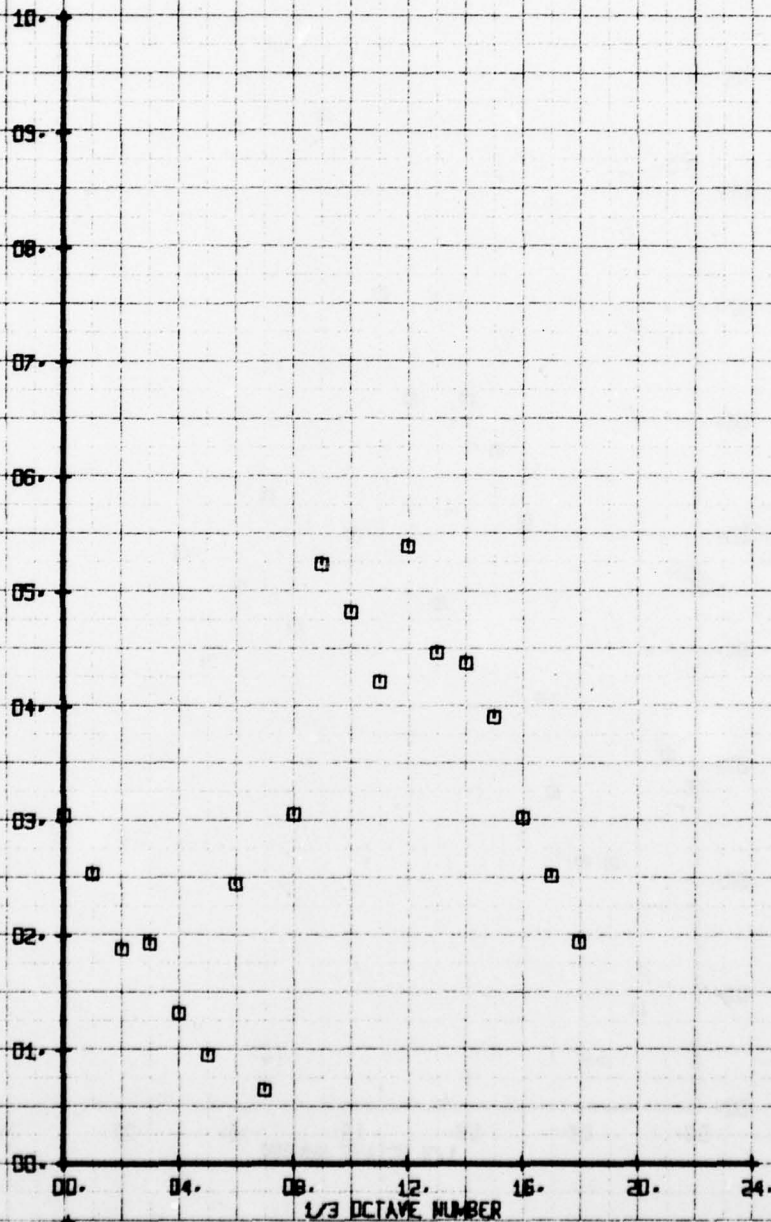
LEGEND  
CH 72  
PARAMETER  
VEL-2LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/1-BLADES OFF, ROT. HUB  
 RUN 180 TP 11

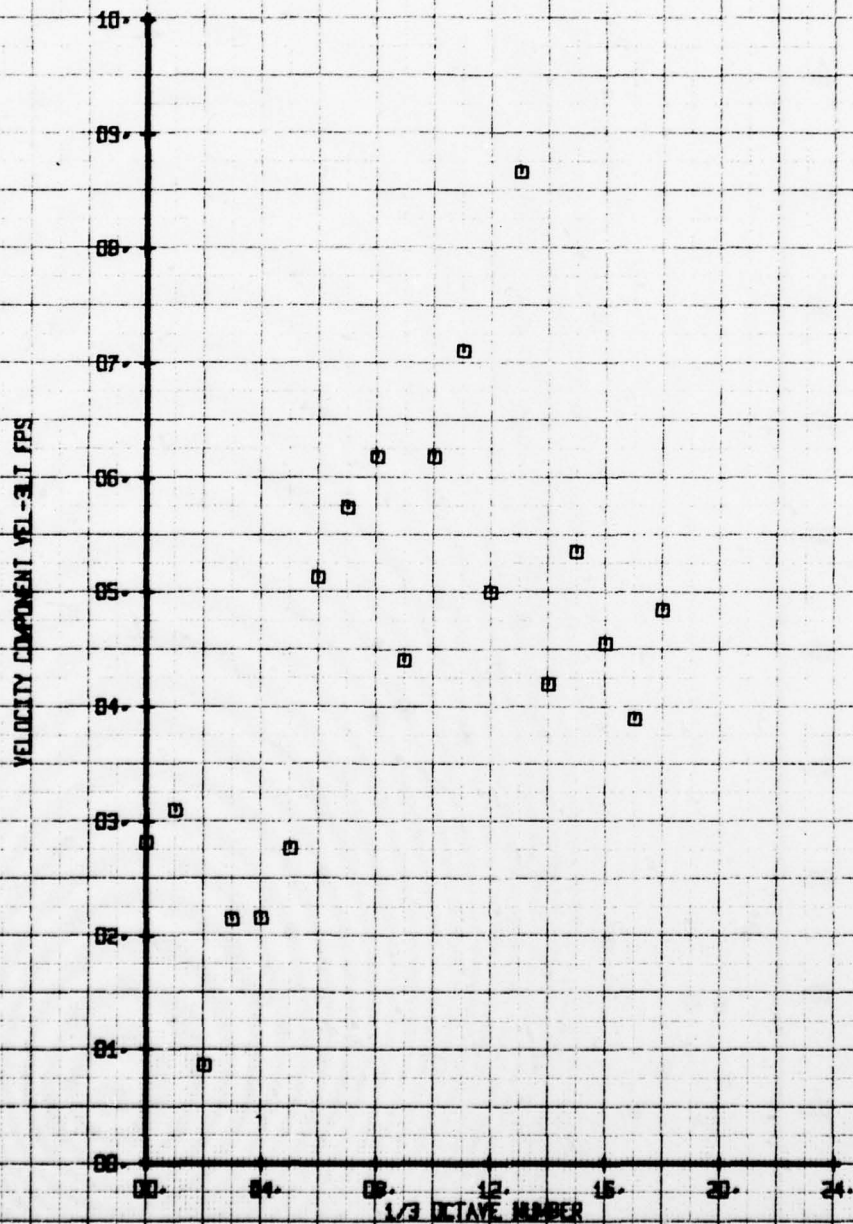
SYM	CH	PARAMETER
□	72	VEL-2LT

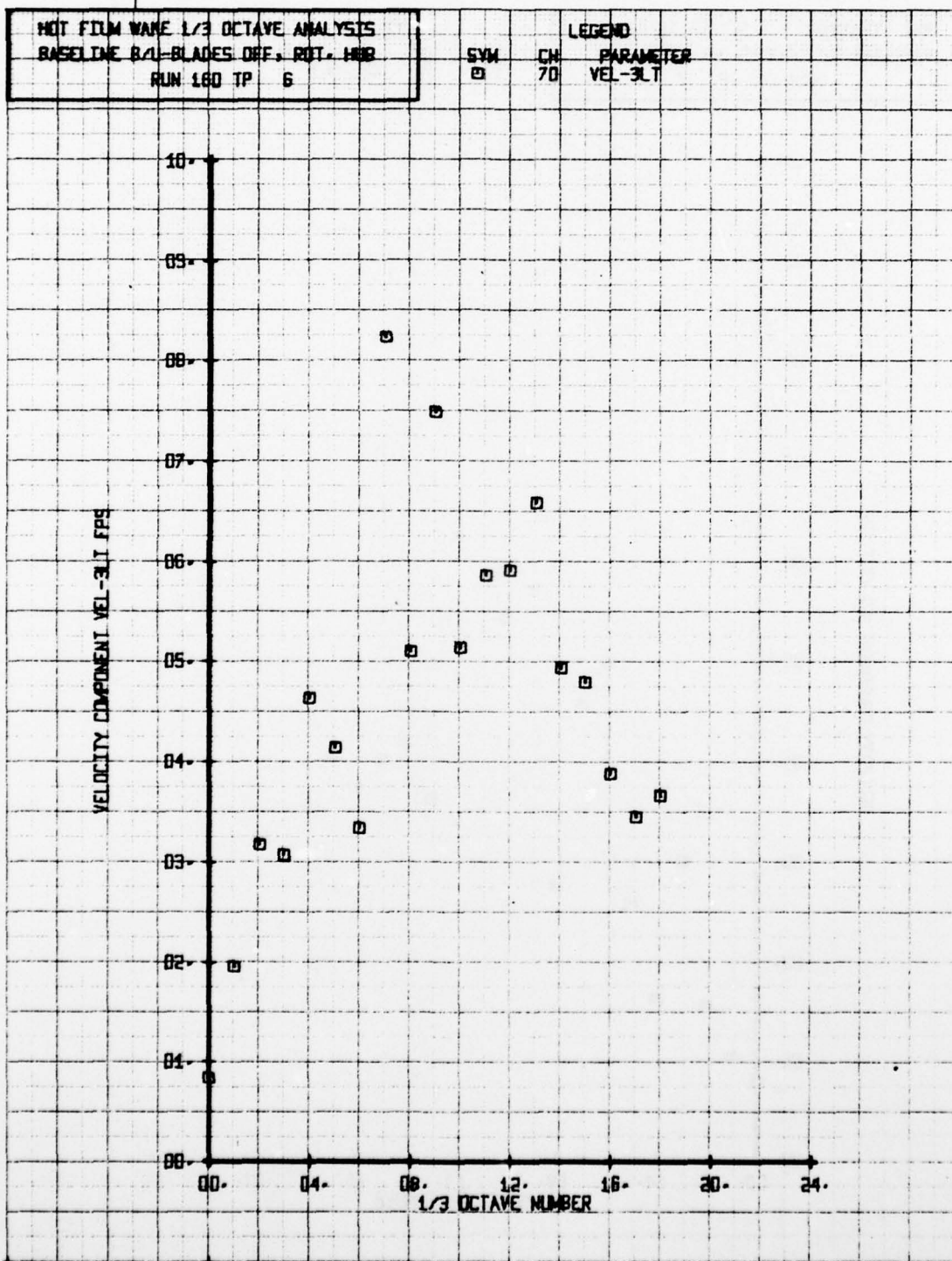
VELOCITY COMPONENT VEL-2LT FPS



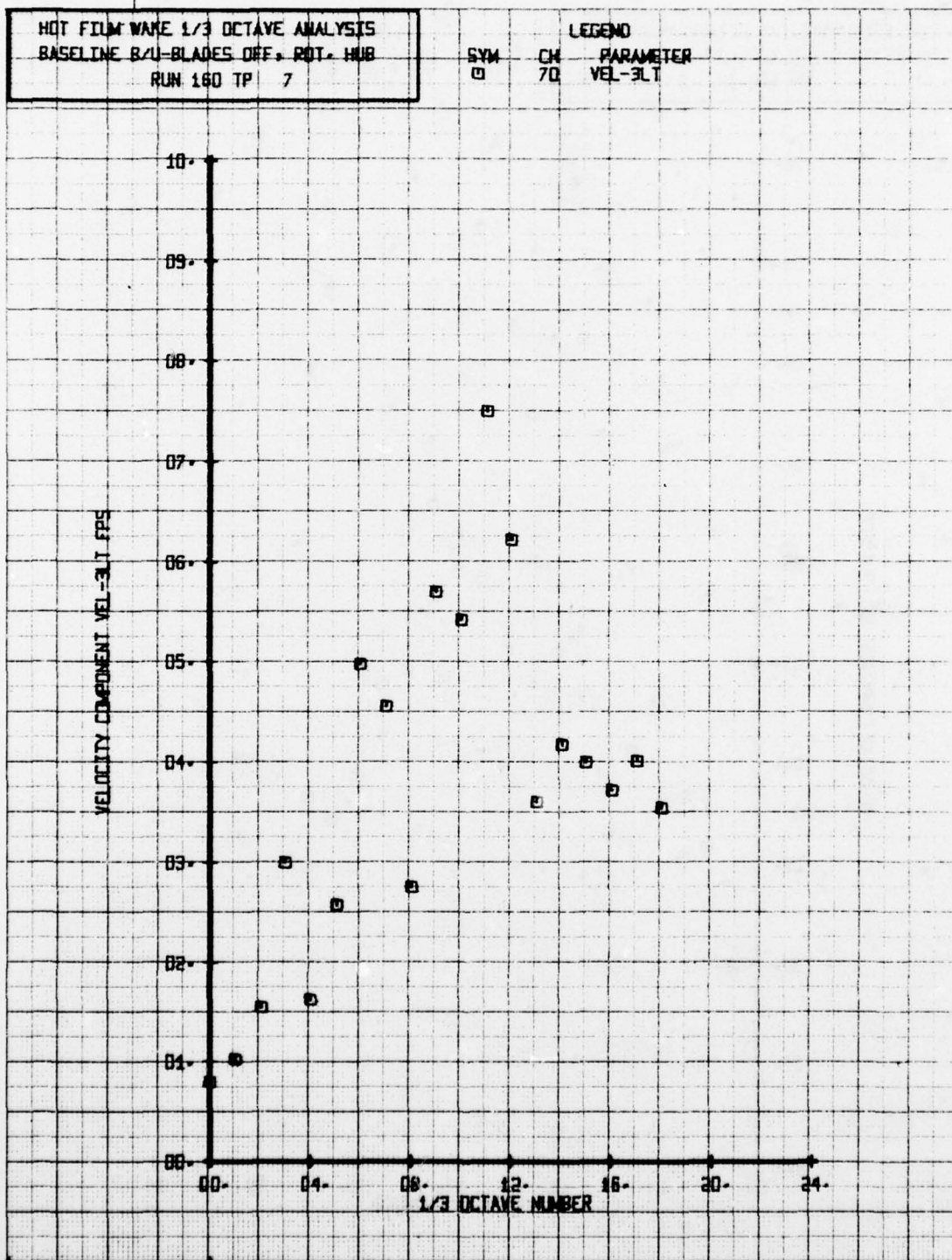
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/1-BLADES OFF, ROT, HUB  
 RUN 160 TP 5

SYN CH PARAMETER  
 70 VEL-3LT



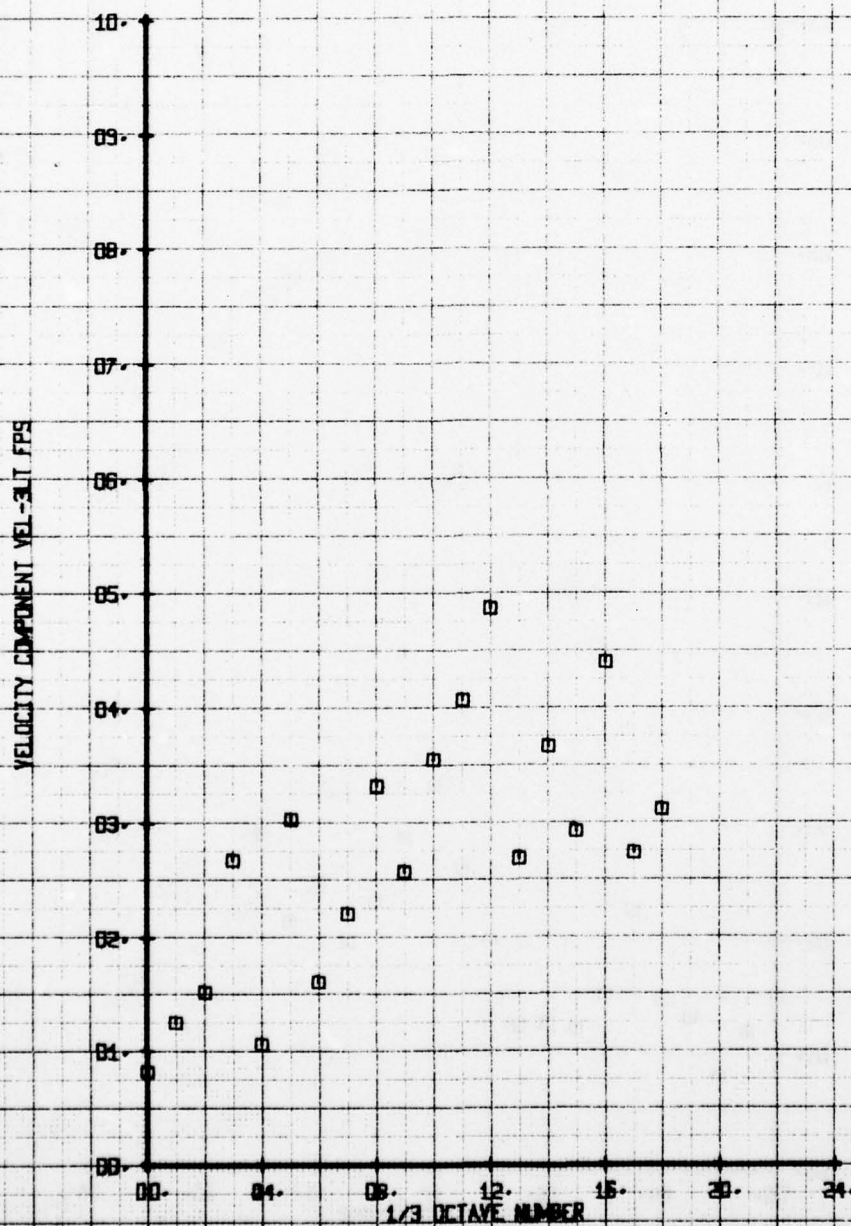


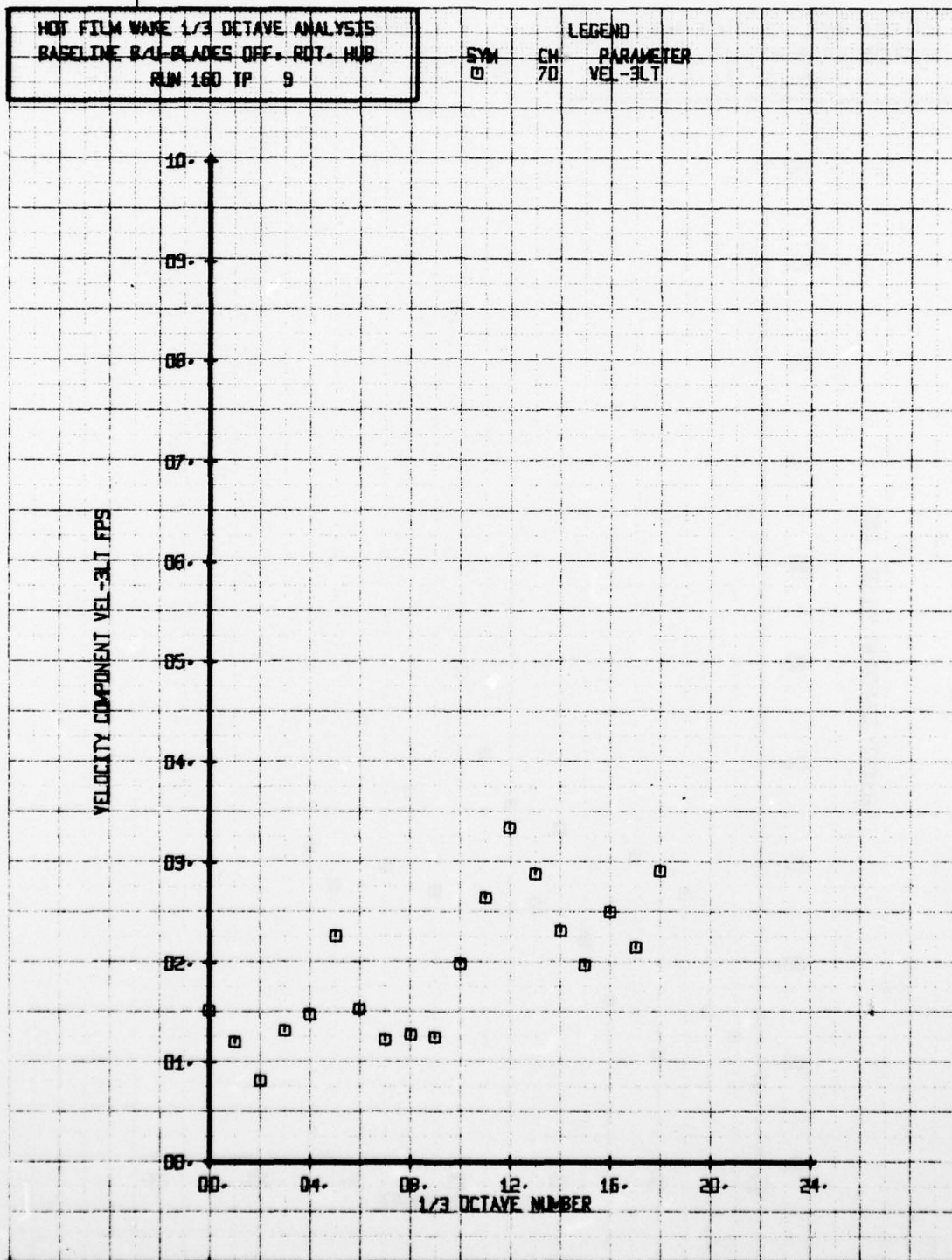




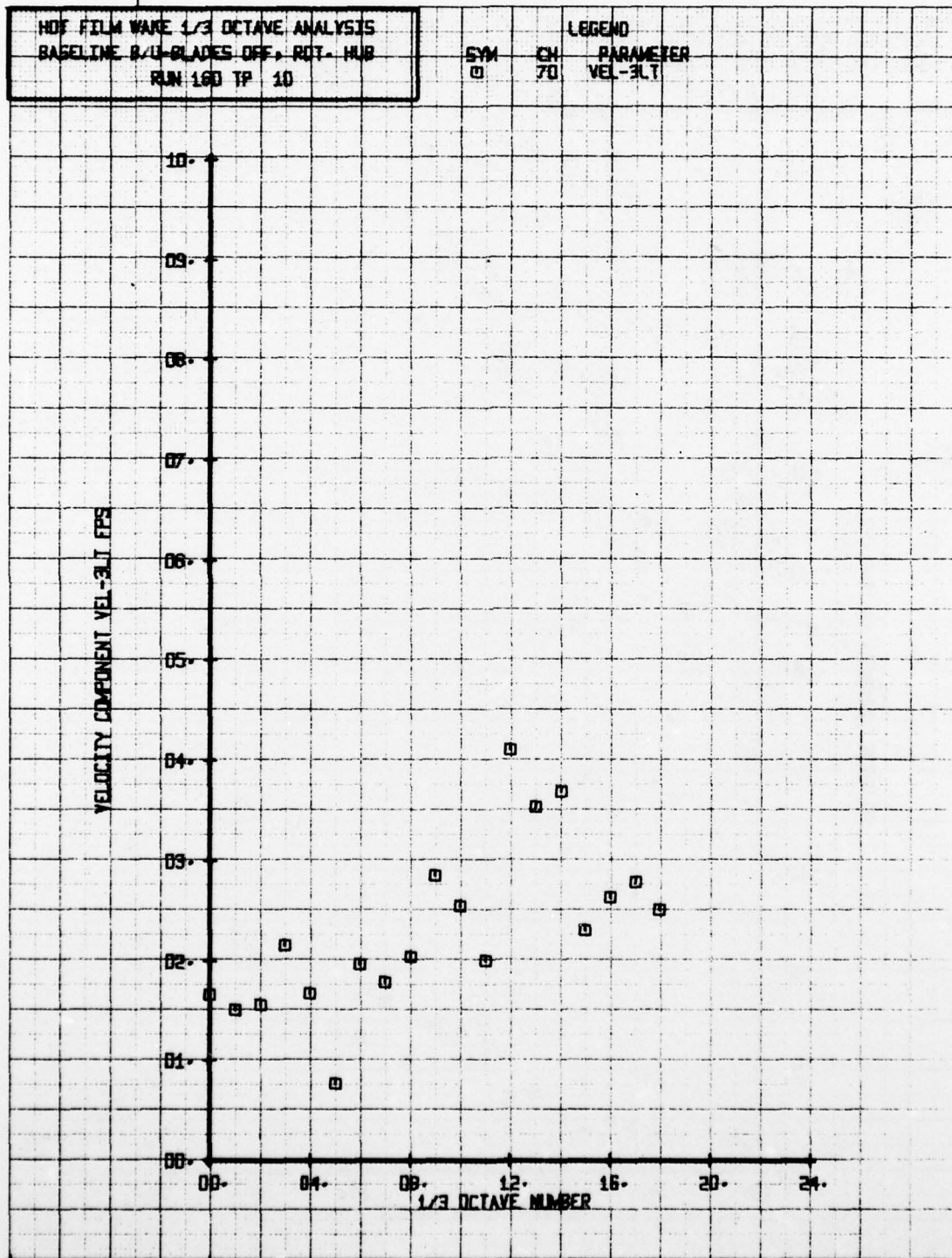
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/1-BLADES OFF, ROT. HUB  
 RUN 160 TP 8

SYM	CM	PARAMETER
□	70	VEL-3LT







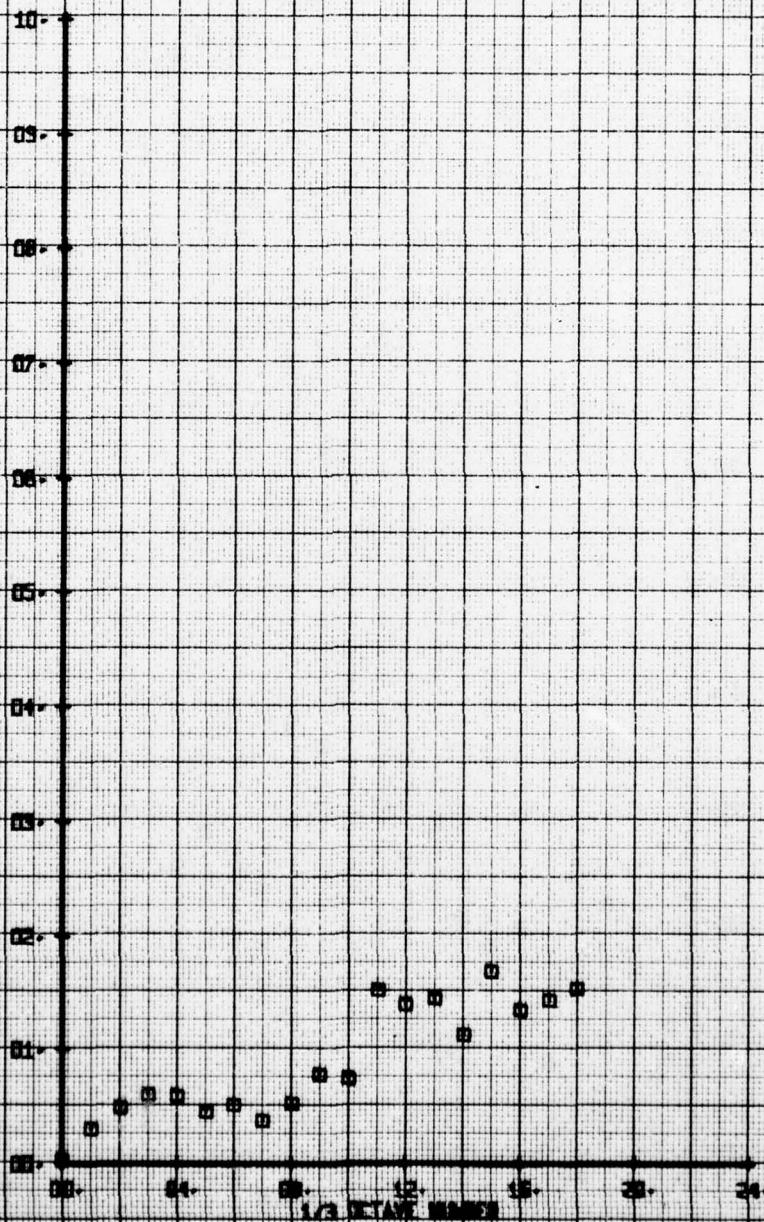




HOT FILM WARE 1/3 OCTAVE ANALYSIS  
 BASELINE 8-1- BLADES OFF, ROT. HUB  
 RUN 160 TP 11

LEGEND		
SYM	CH	PARAMETER
□	70	VEL-3LT

VELOCITY COMPONENT VEL-3LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 2

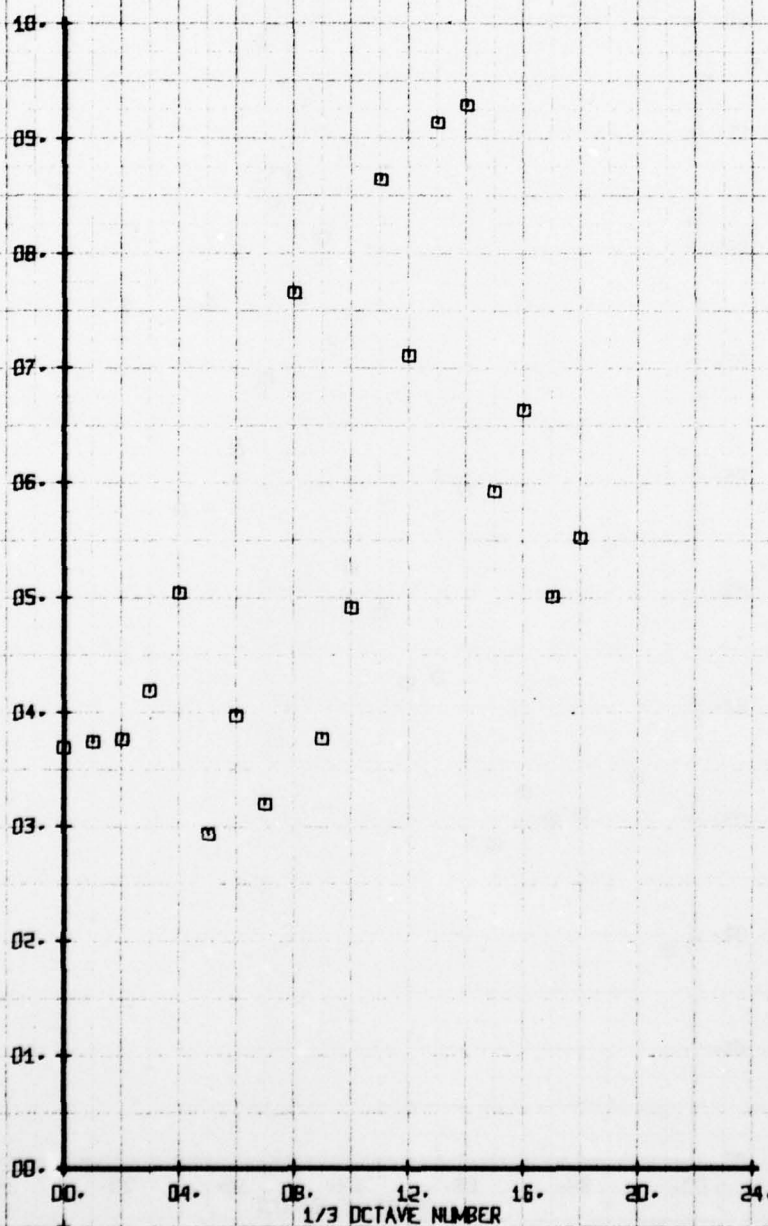
SYM  
 □

CH  
 71

LEGEND

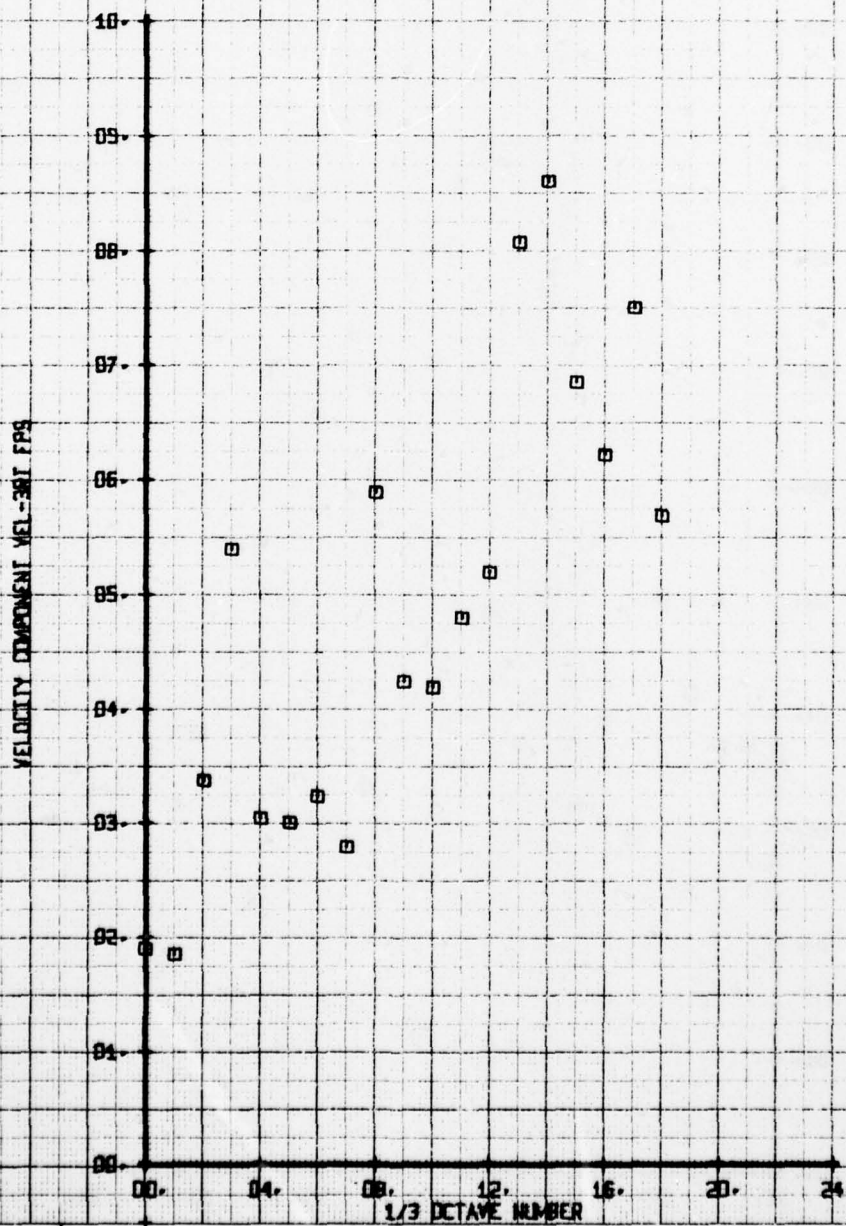
PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 196 TP 3

LEGEND  
 SYM CH PARAMETER  
 □ 71 VEL-3RT





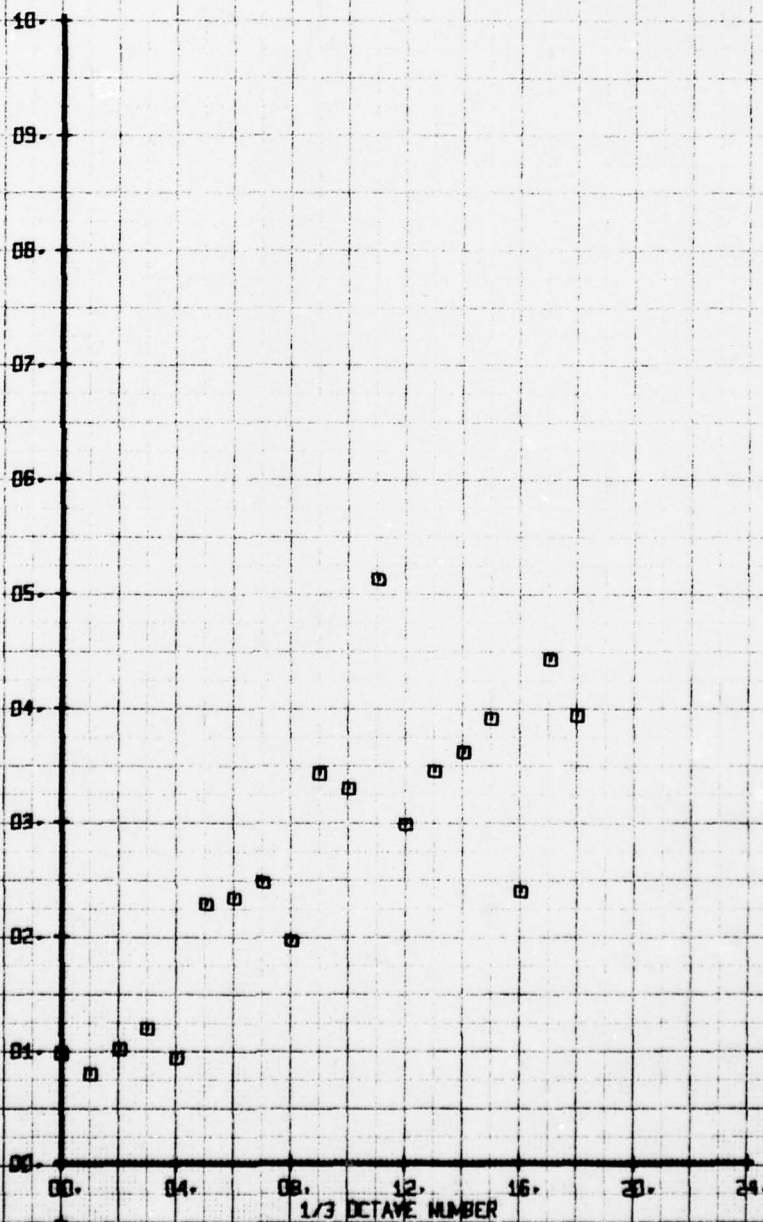
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 4

SYM  
 □

CH  
 71

LEGEND  
 PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS





AD-A061 994

BOEING VERTOL CO PHILADELPHIA PA

F/G 1/3

INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONF--ETC(U)

SEP 78 P F SHERIDAN

DAAJ02-77-C-0020

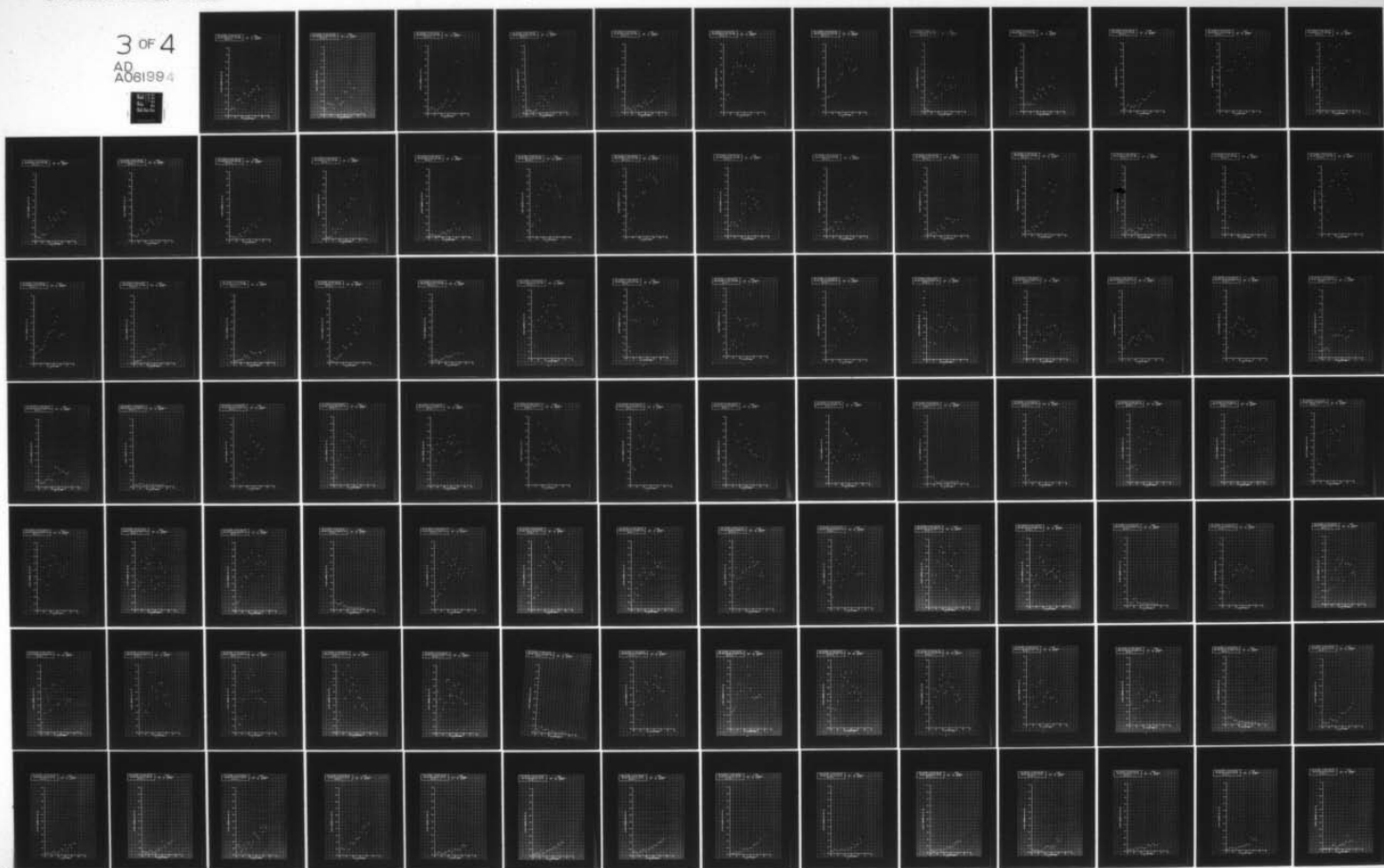
UNCLASSIFIED

USARTL-TR-78-23F

NL

3 OF 4

AD  
A061994

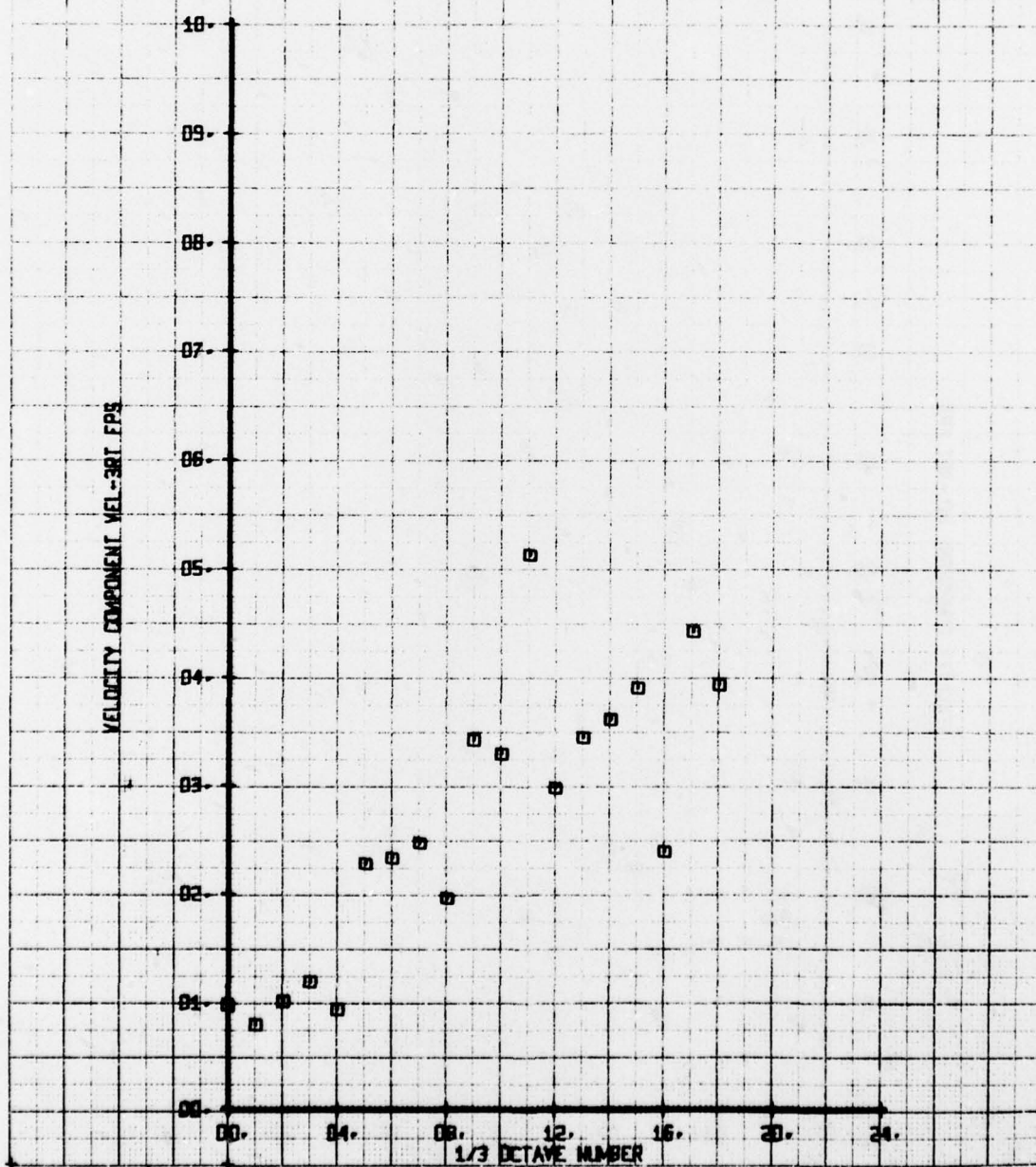


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 4

SYM  
 0

CH  
 71

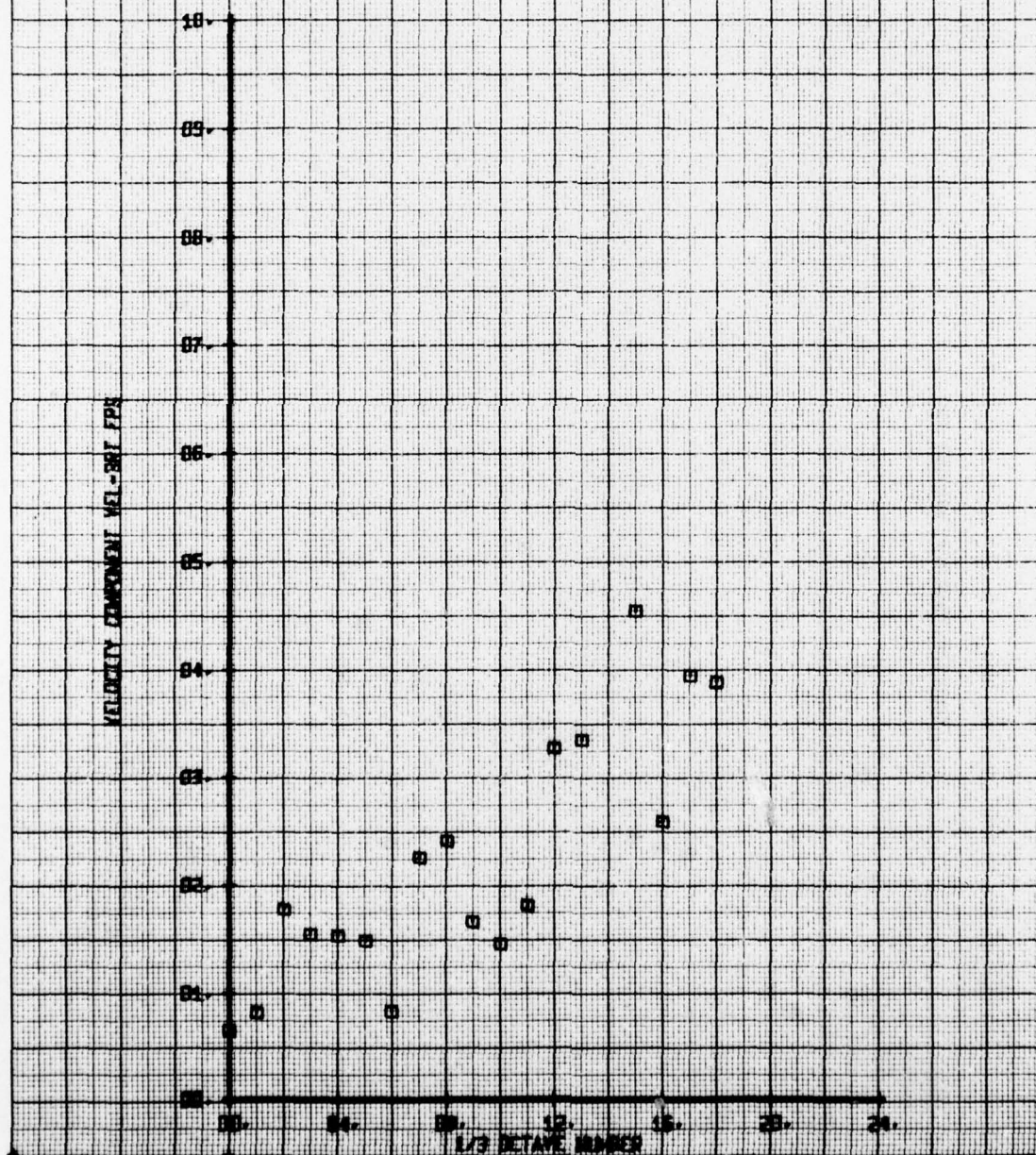
LEGEND  
 PARAMETER  
 VEL-3RT



HOT FILM WAVE 1/3 OCTAVE ANALYSIS  
 BASELINE-MIG WITH STIFF PITCH ARMS  
 RUN 156 TP 5

SYM	CH	PARAMETER
□	71	VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



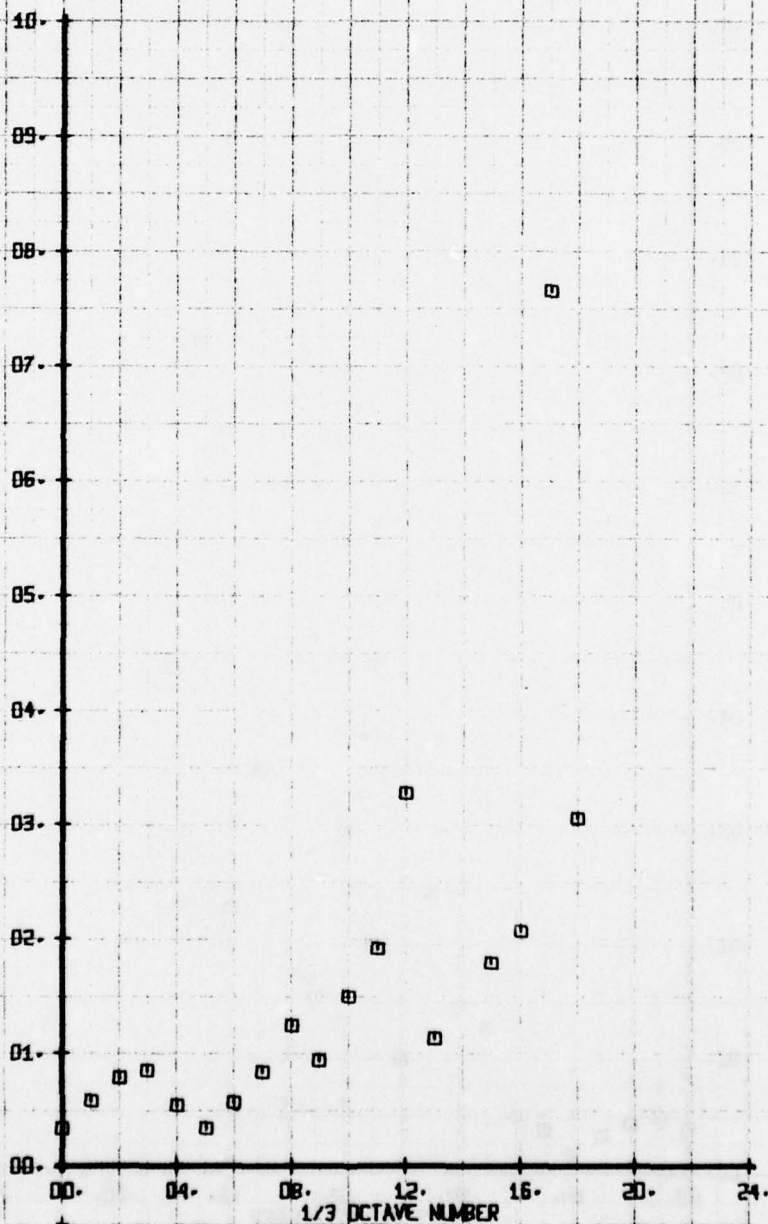
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 IP 6

SYM  
 0

CH  
 71

LEGEND  
 PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS

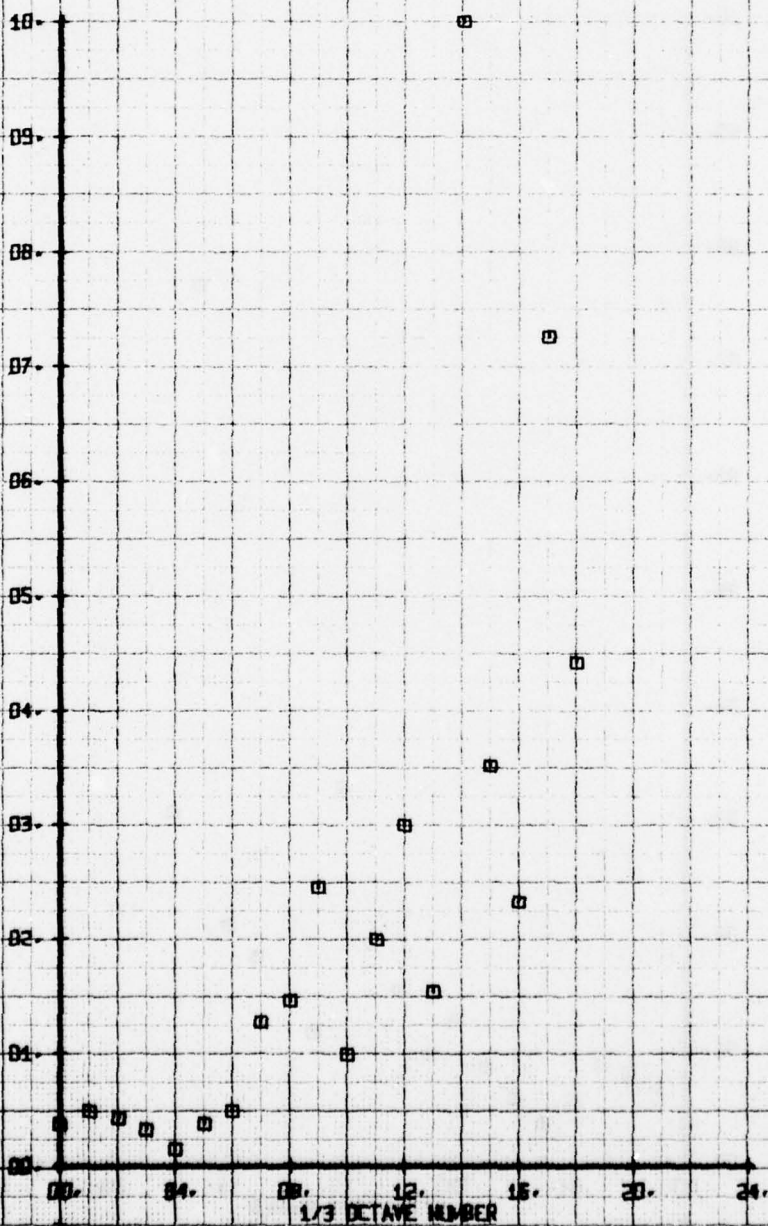




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 7

SYM CH PARAMETER  
 □ 71 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



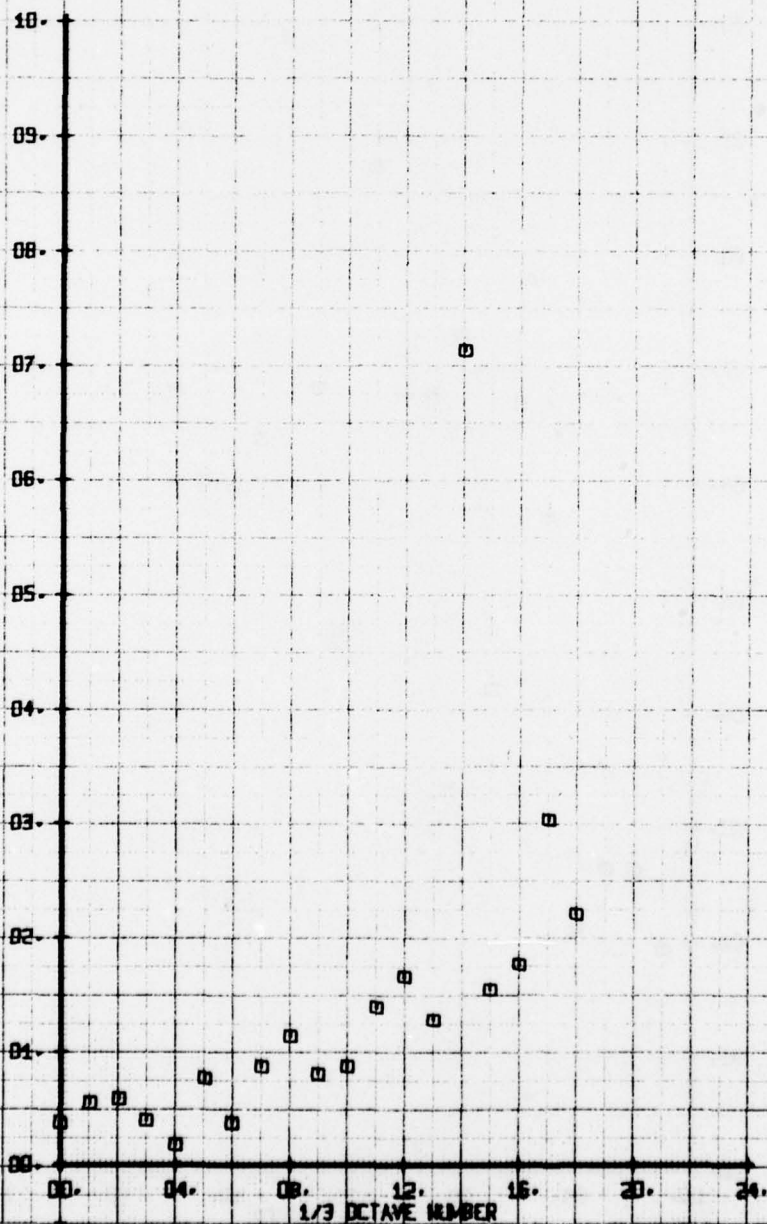
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE-HUB WITH STIFF PITCH ARMS  
RUN 156 TP 8

SYM  
□

LEGEND

CH: 71  
PARAMETER  
VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



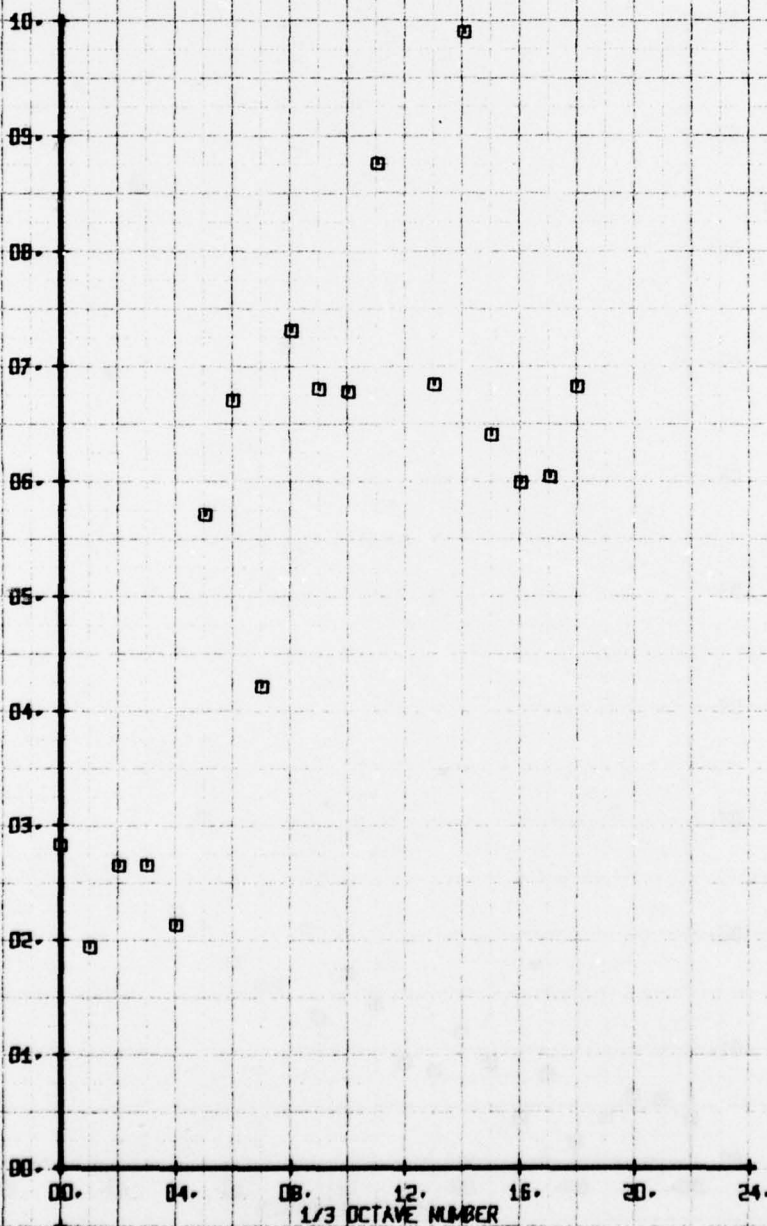
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARM  
 RUN 156 TP 2

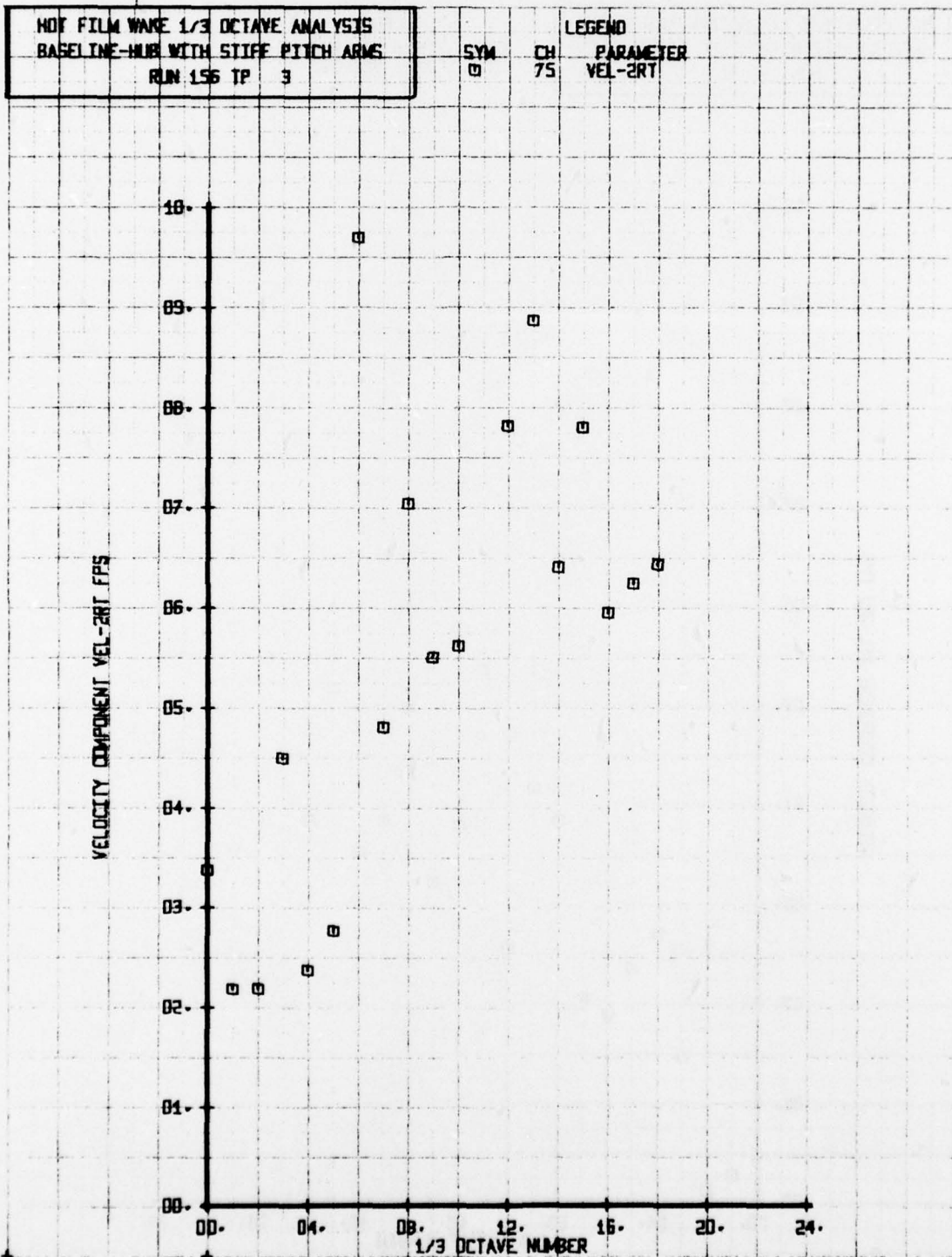
SYM  
 0

CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS







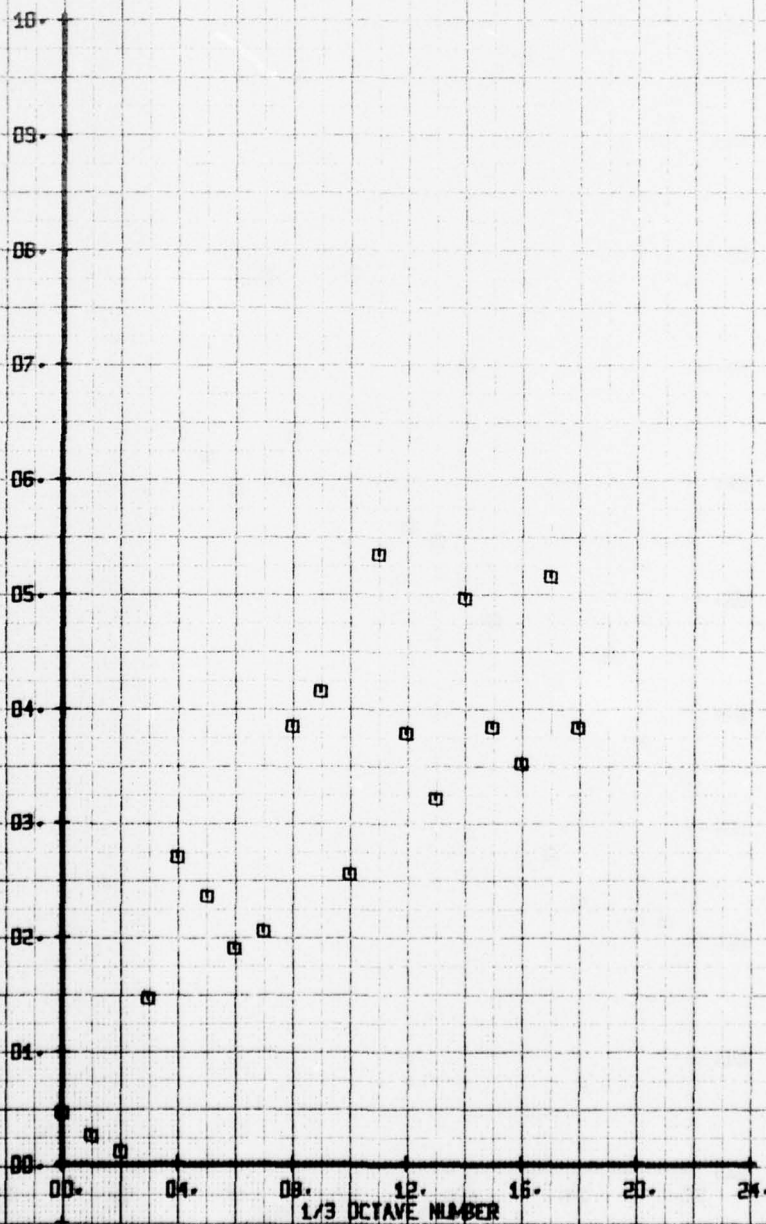
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 4

SYM  
 □

CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS

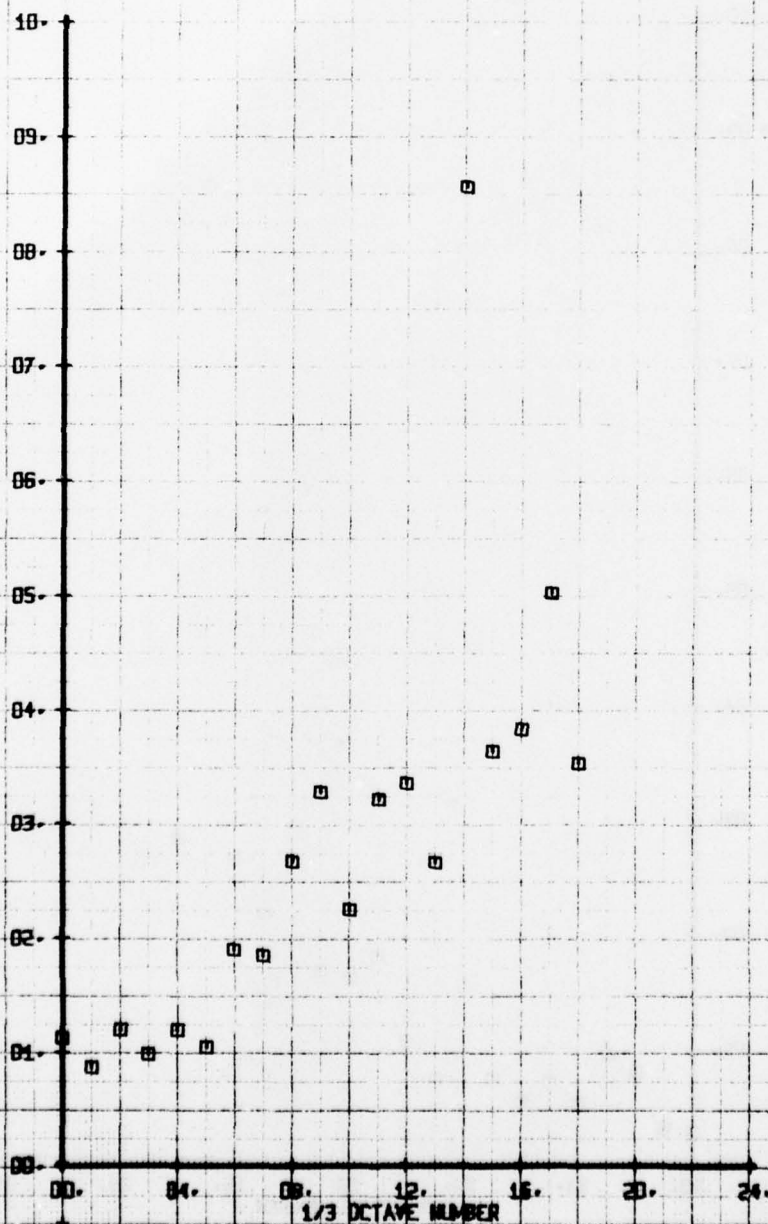


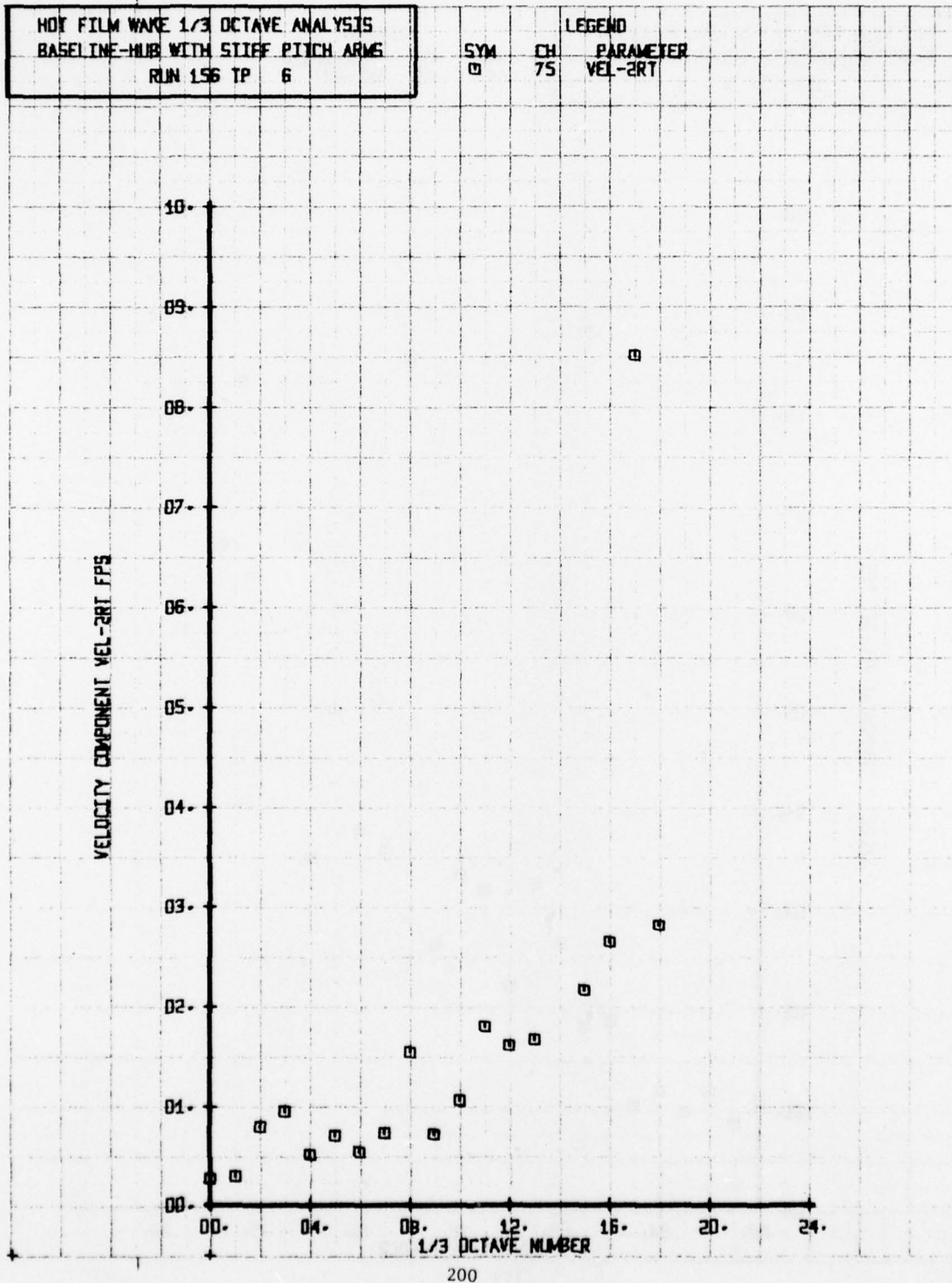
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 5

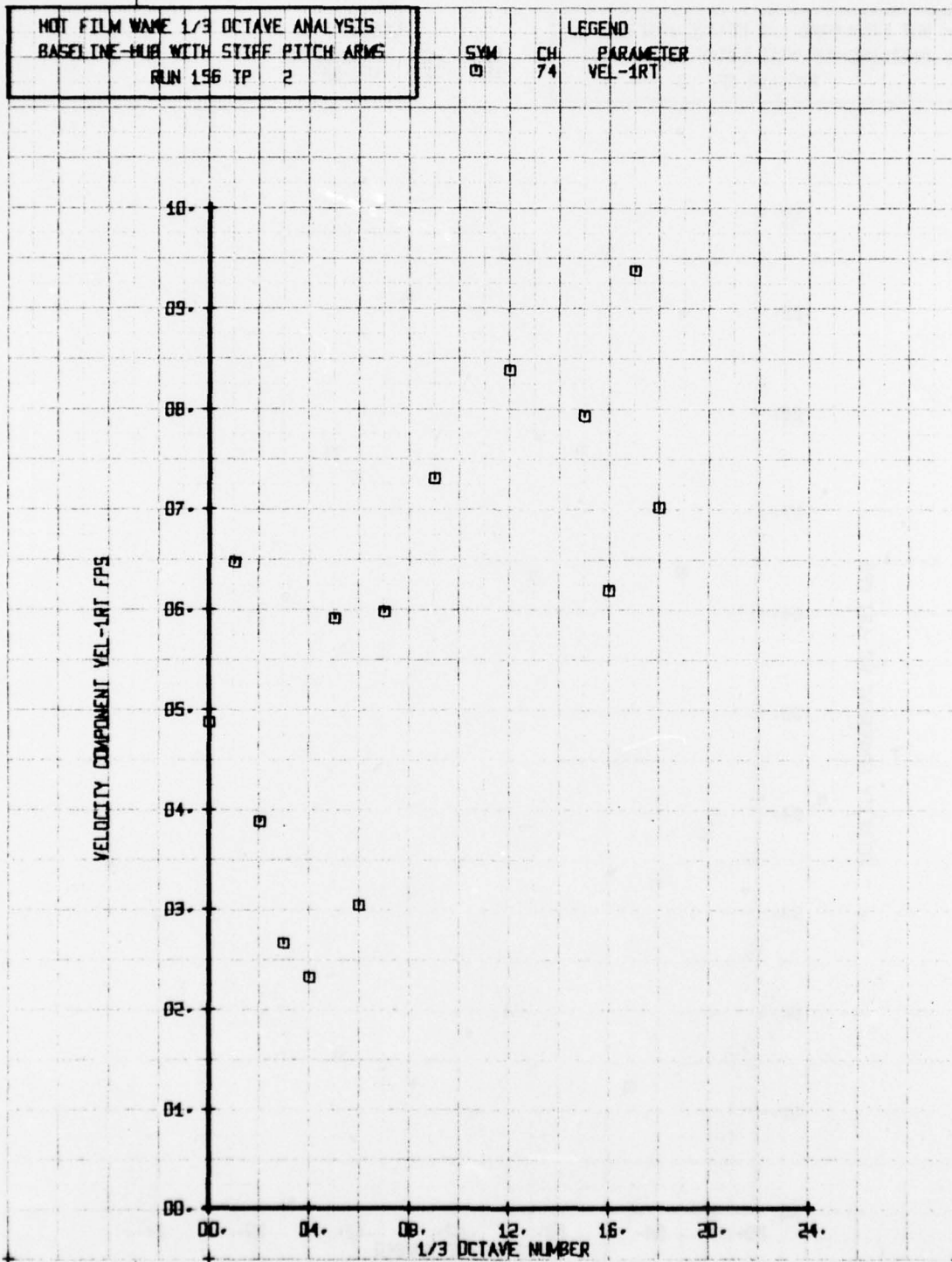
SYM  
 □

LEGEND  
 CH 75  
 PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS









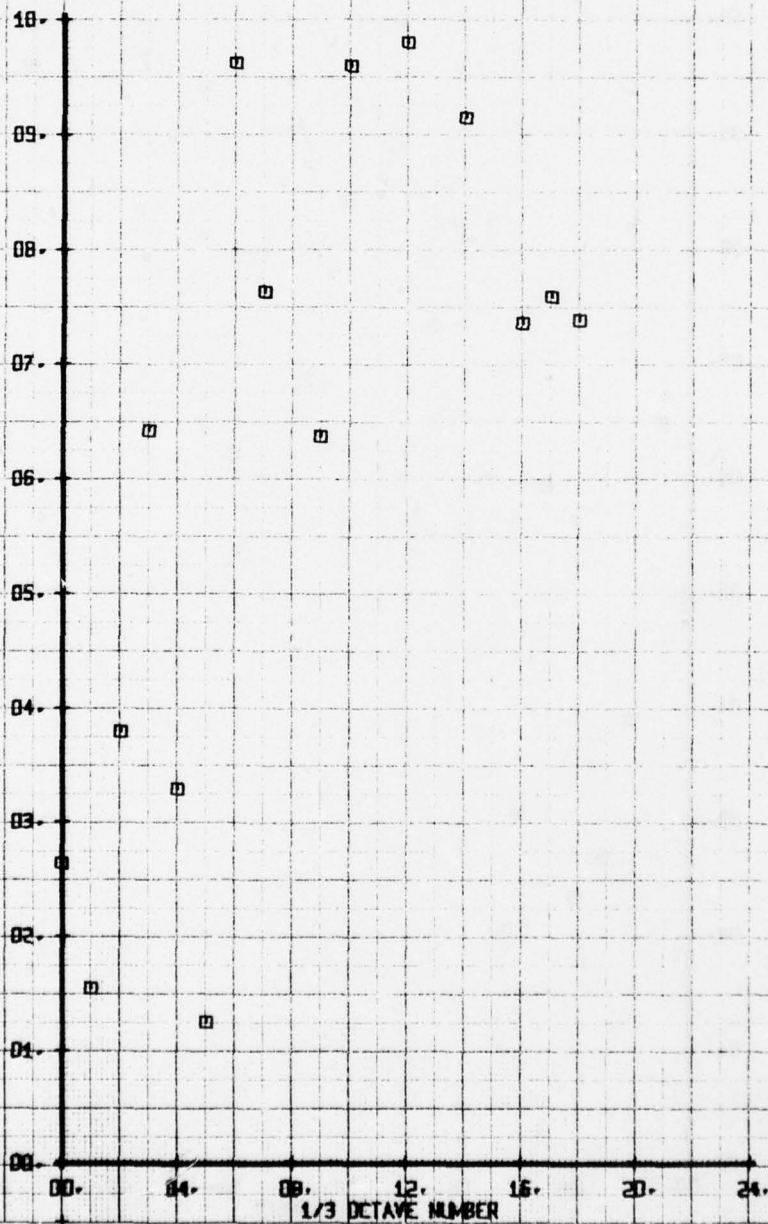
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 3

SYM  
 □

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

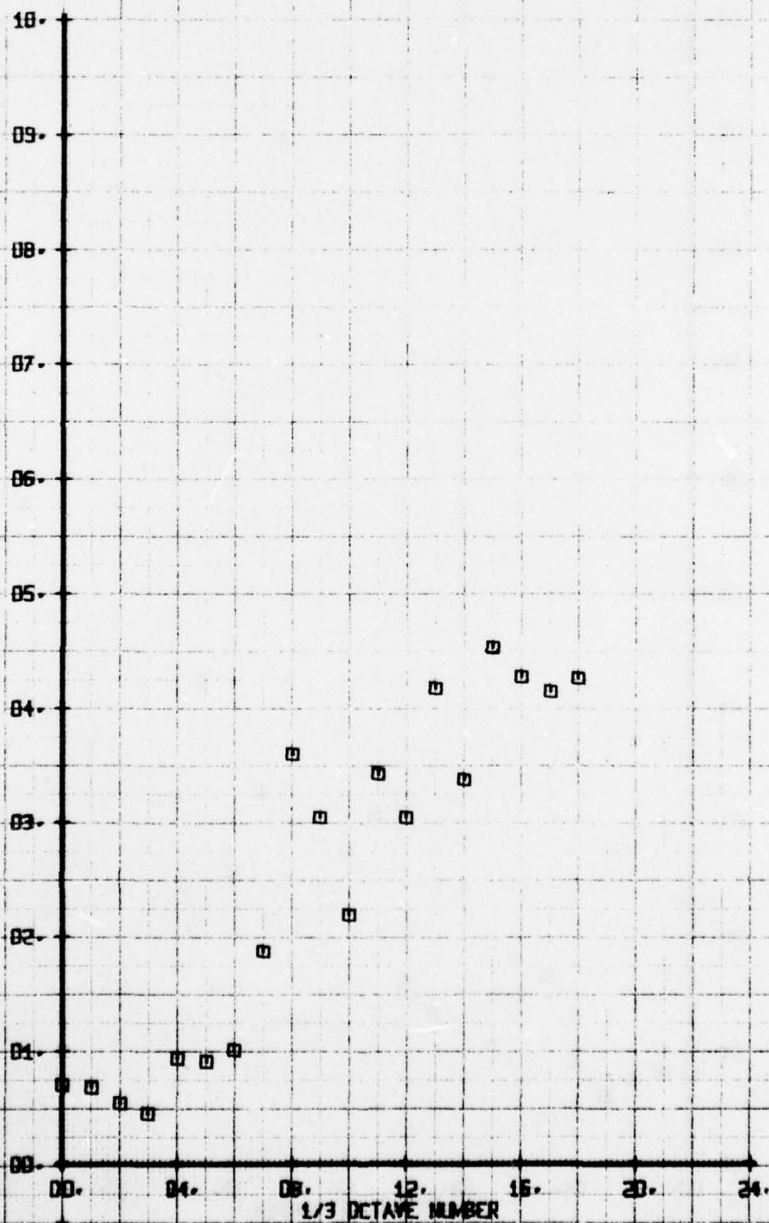
VELOCITY COMPONENT VEL-1RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE-HUB WITH STIFF PITCH ARMS  
RUN 156 TP 4

SYN CH PARAMETER  
0 74 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS



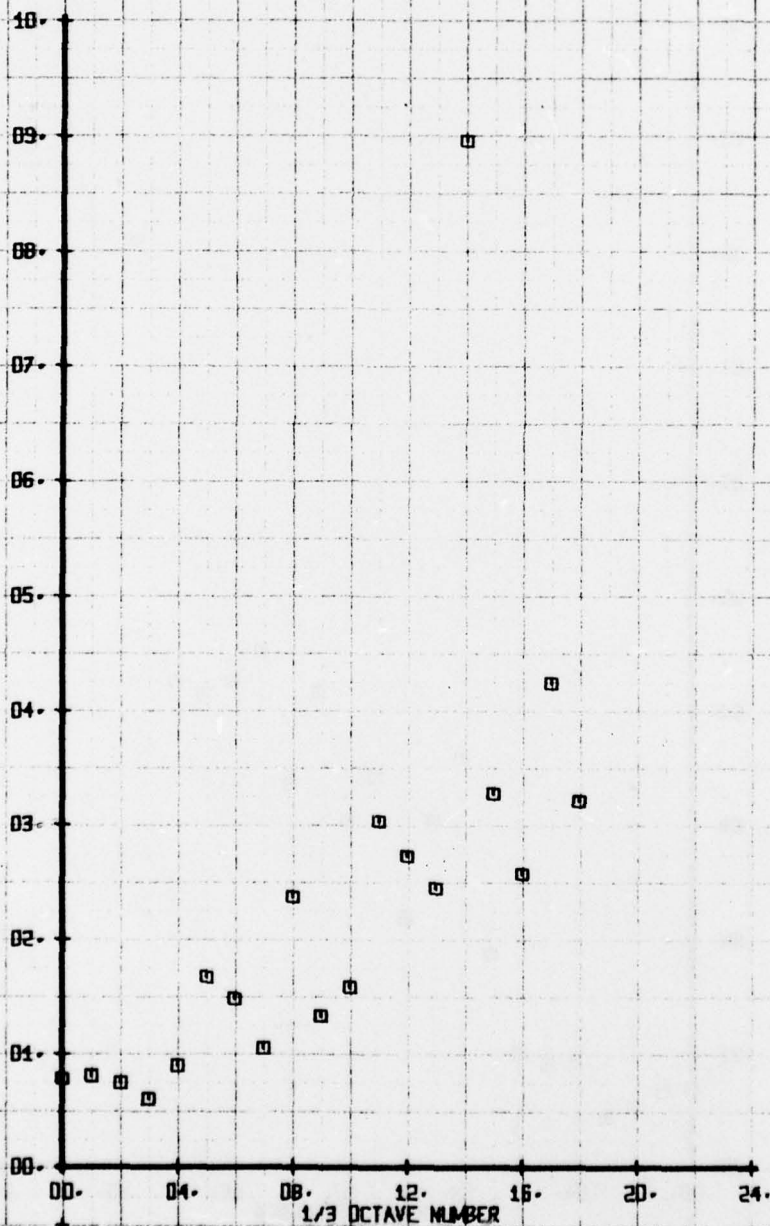
HDT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 5

SYM  
 □

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS



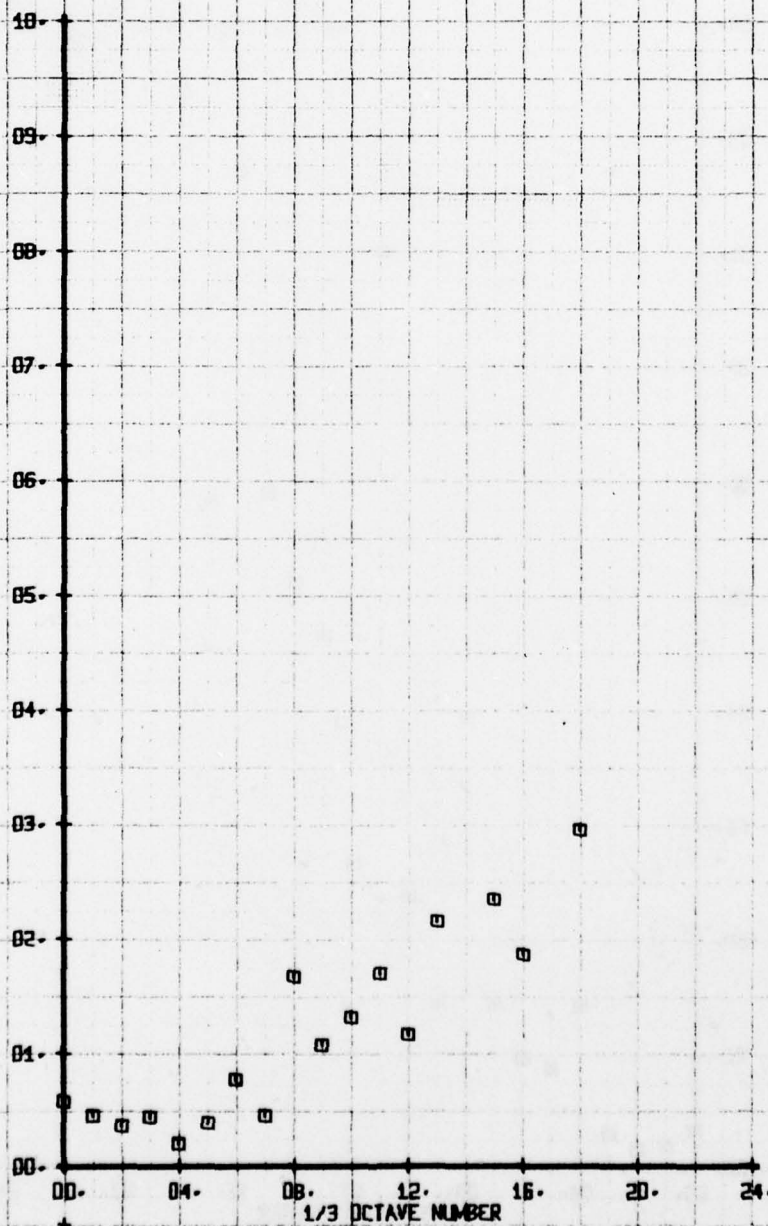
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE-HUB WITH STIFF PITCH ARMS  
RUN 156 TP 6

SYM  
□

CH  
74

LEGEND  
PARAMETER  
VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS



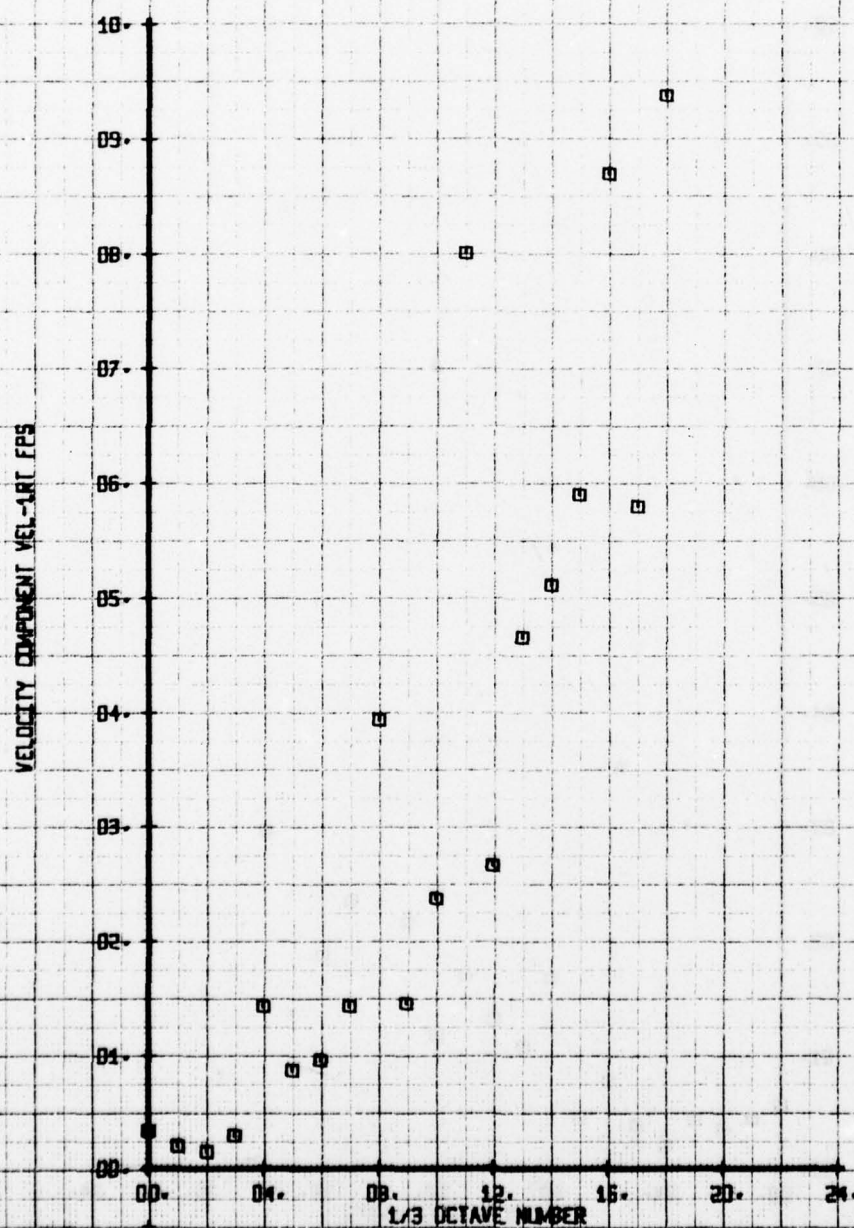


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 7

SYM  
 □

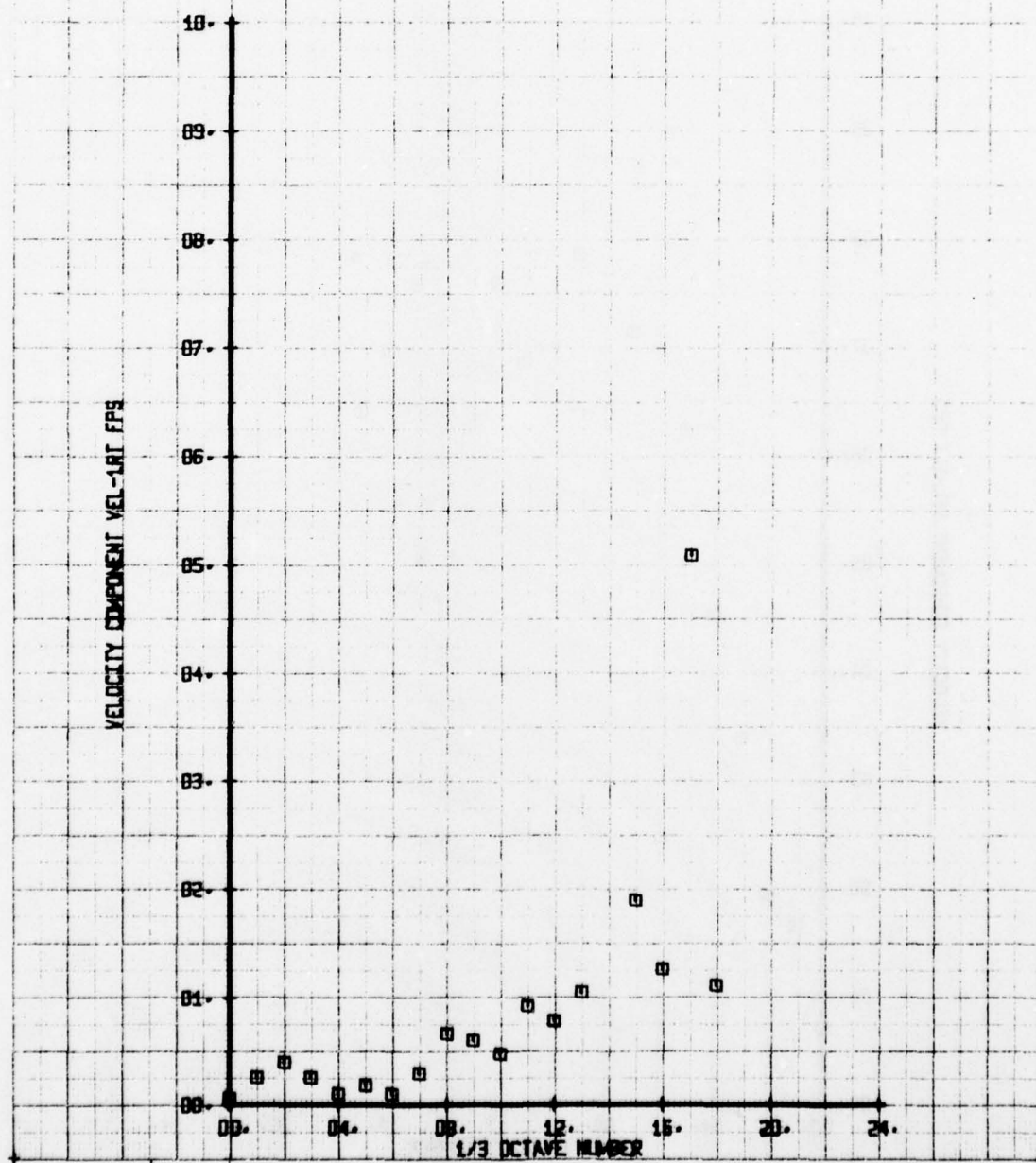
CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 8

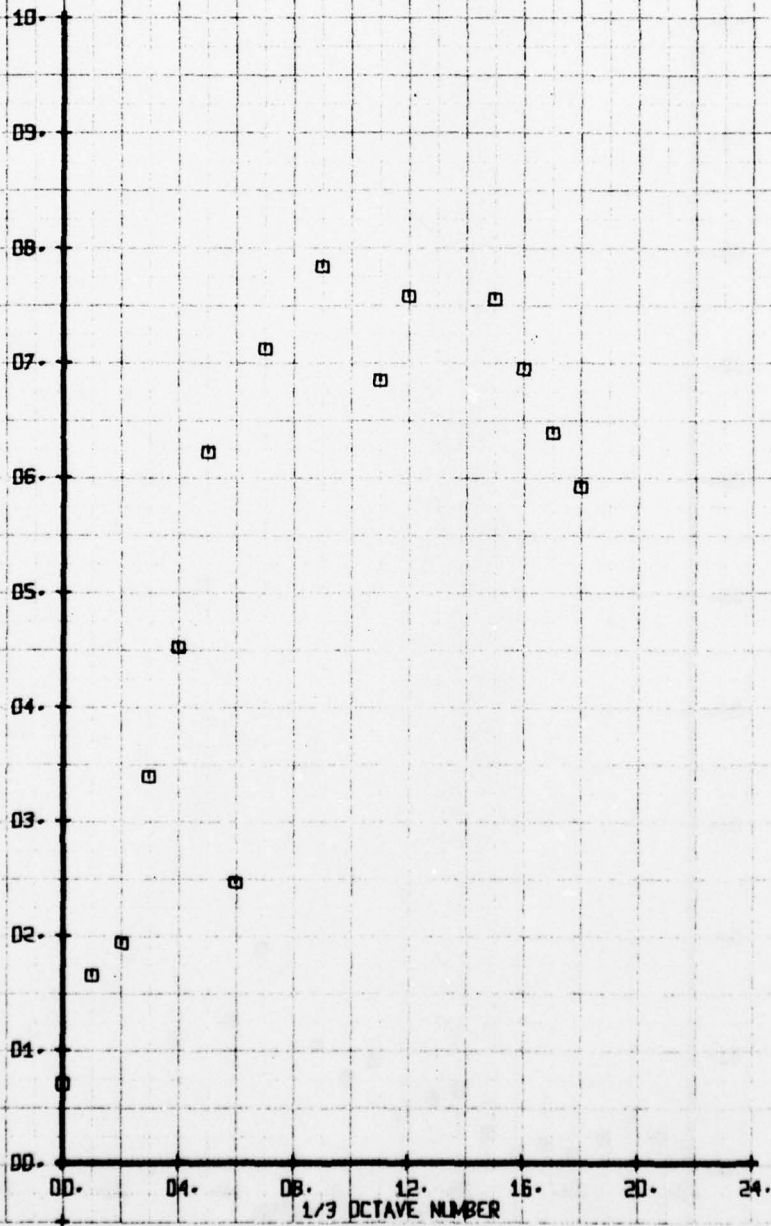
LEGEND  
 SYM CH PARAMETER  
 □ 74 VEL-1RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE-HUB WITH STIFF PITCH ARMS  
RUN 156 TP 2

SYM	CH	PARAMETER
□	73	VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS



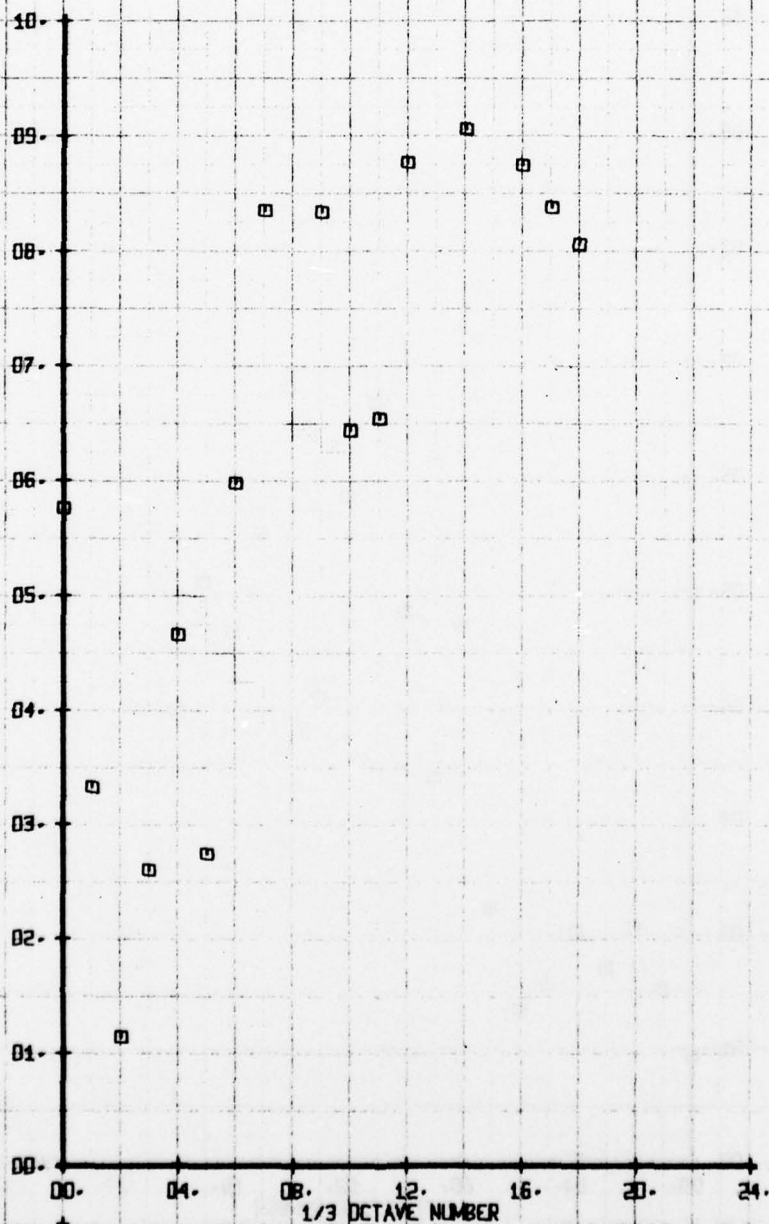
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 3

SYM  
 0

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS





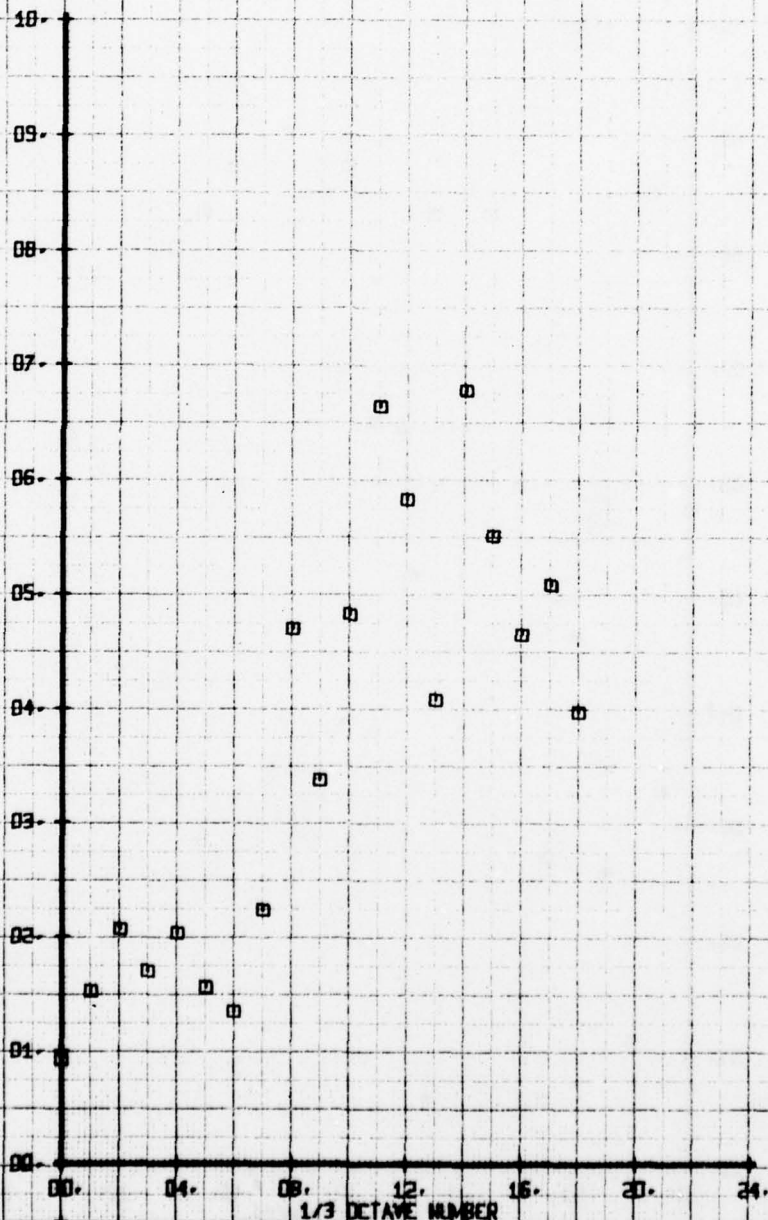
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 IP 4

SYM  
 0

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS

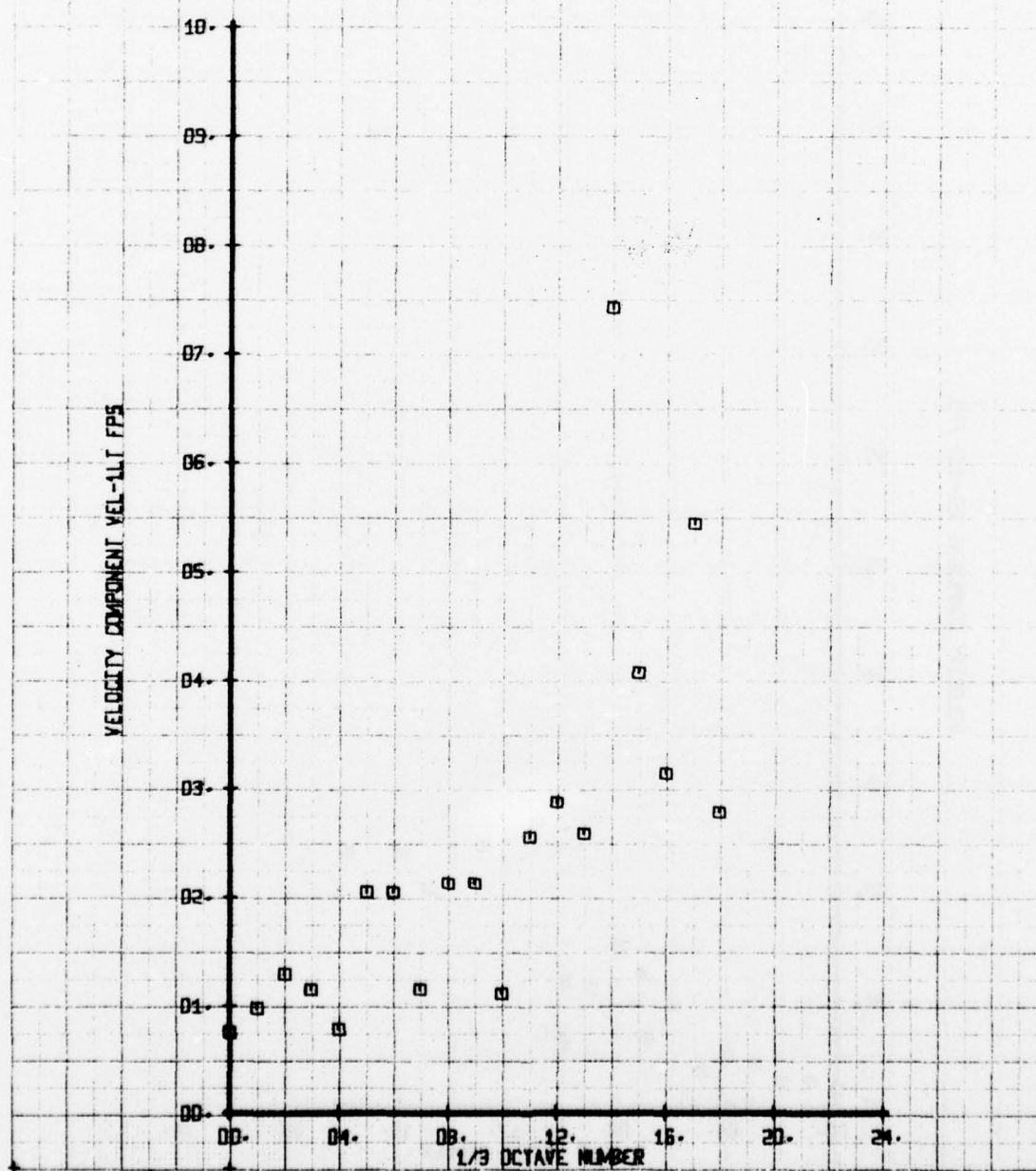


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 5

SYM  
 □

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LT

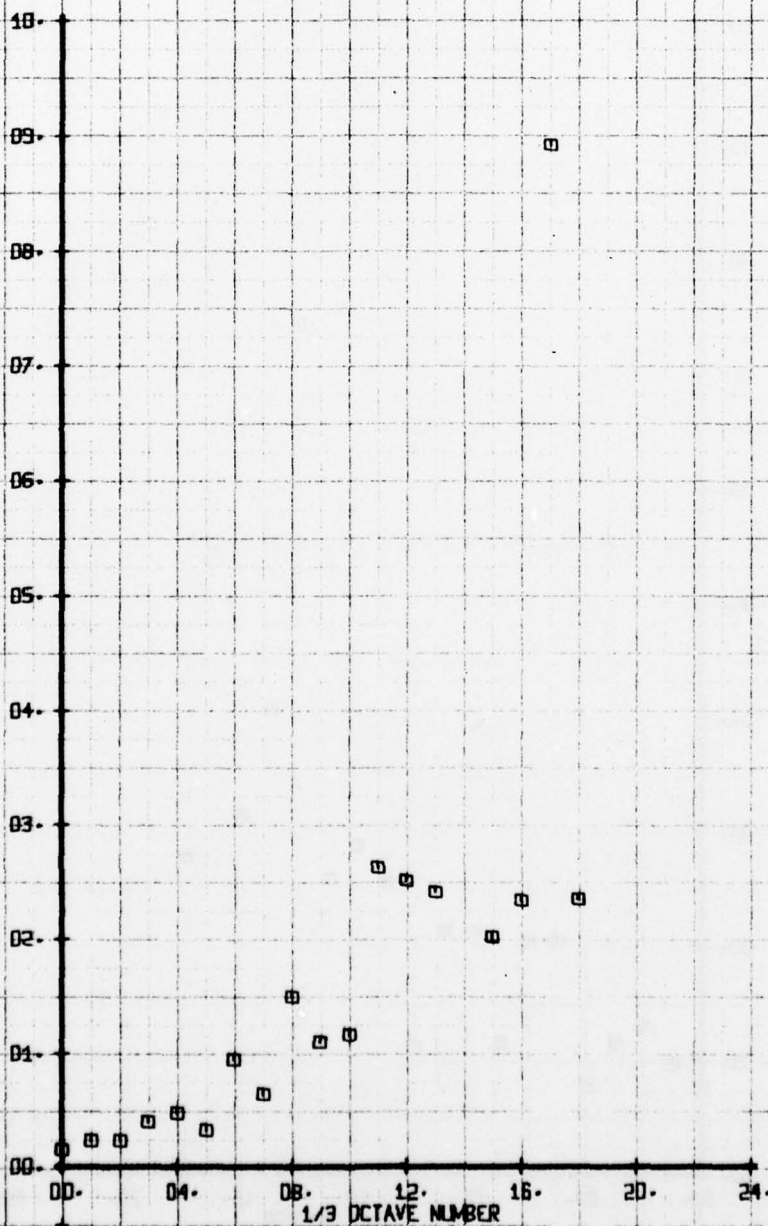


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 6

SYM  
 □

LEGEND  
 CH 73  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS

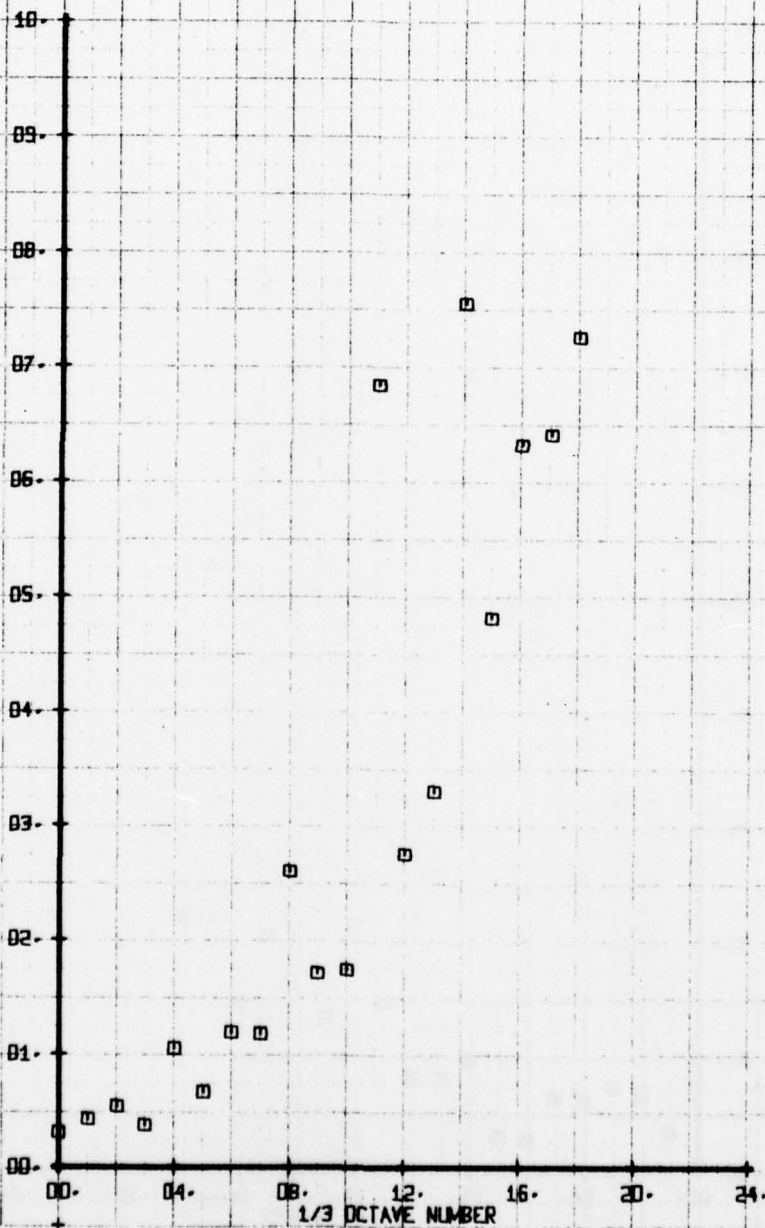


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 7

SYM  
 0

LEGEND  
 CH 73  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS





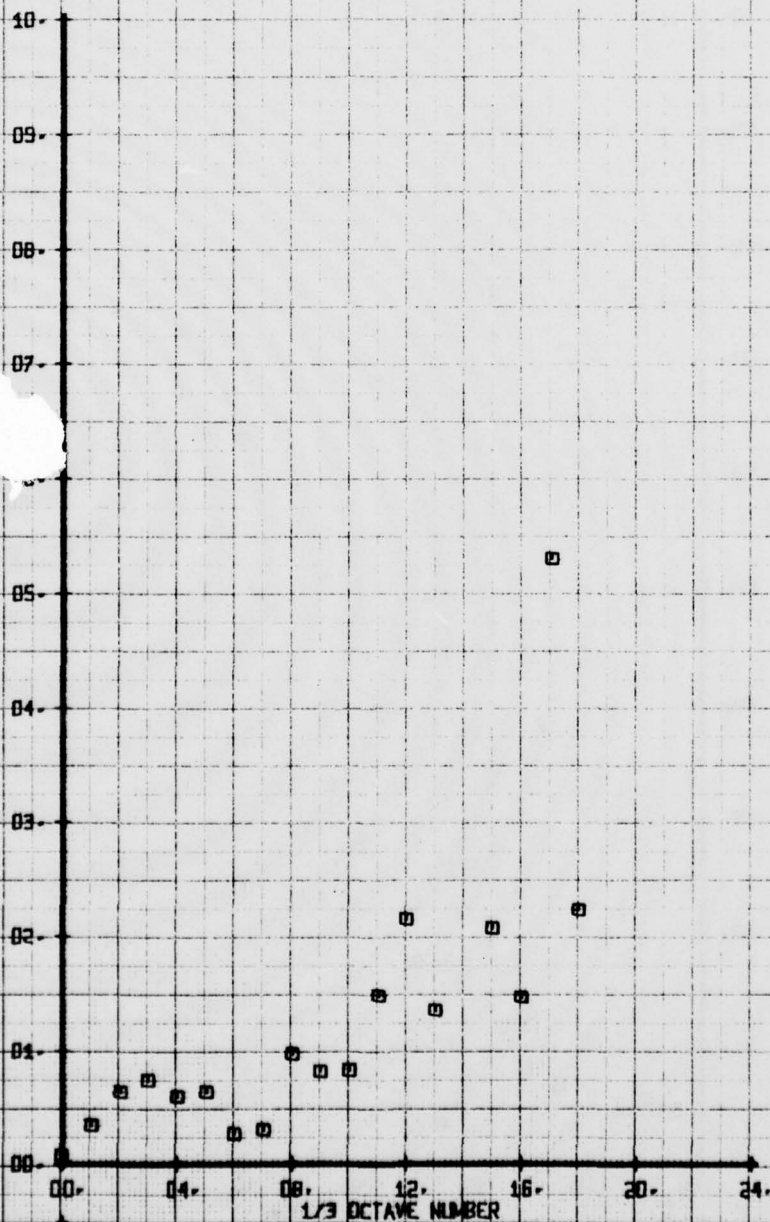
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE-HUB WITH STIFF PITCH ARMS  
RUN 156 TP B

SYM  
□

CH  
73

LEGEND  
PARAMETER  
VEL-1LT

VELOCITY COMPONENT VEL-1LT

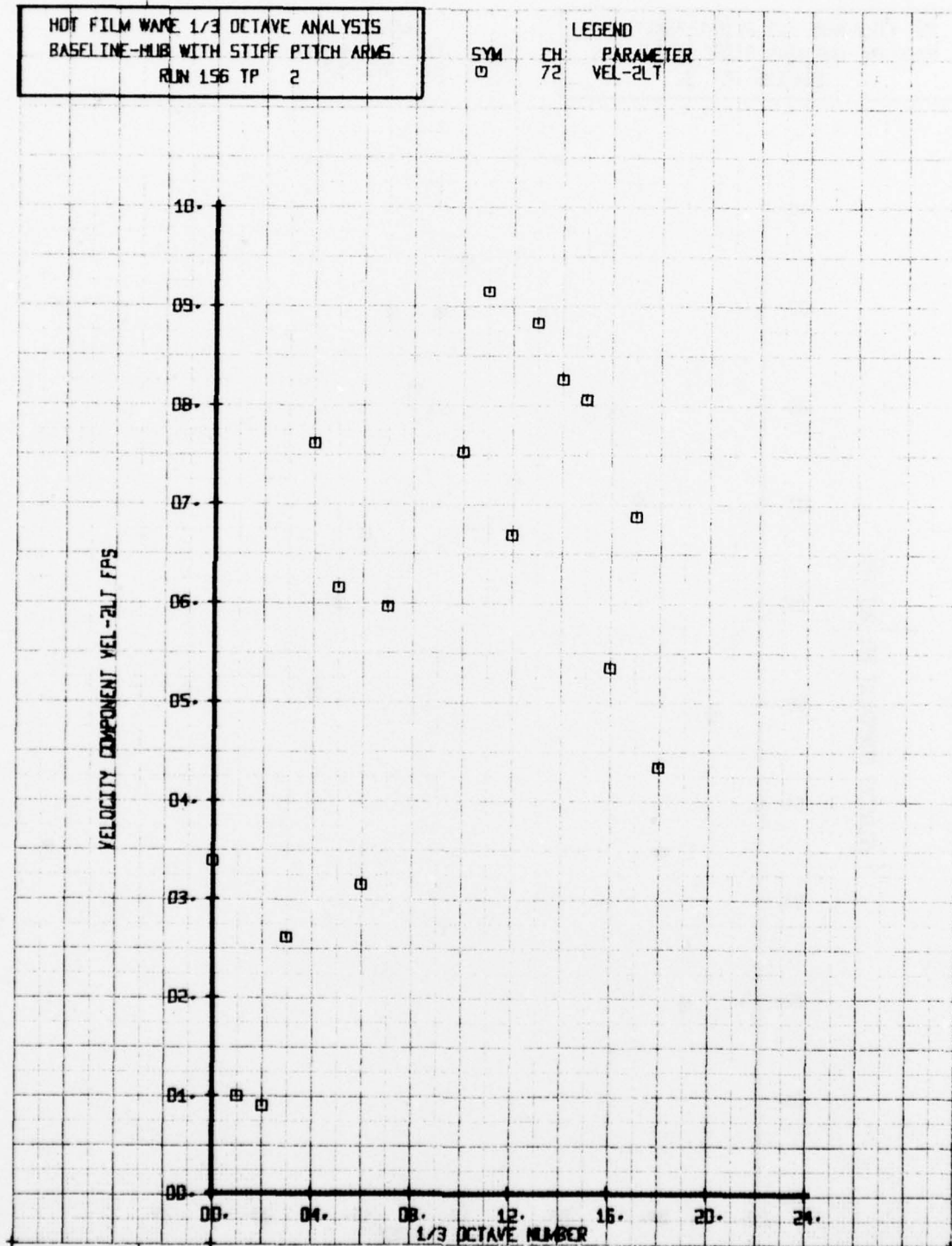


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 2

SYM  
 □

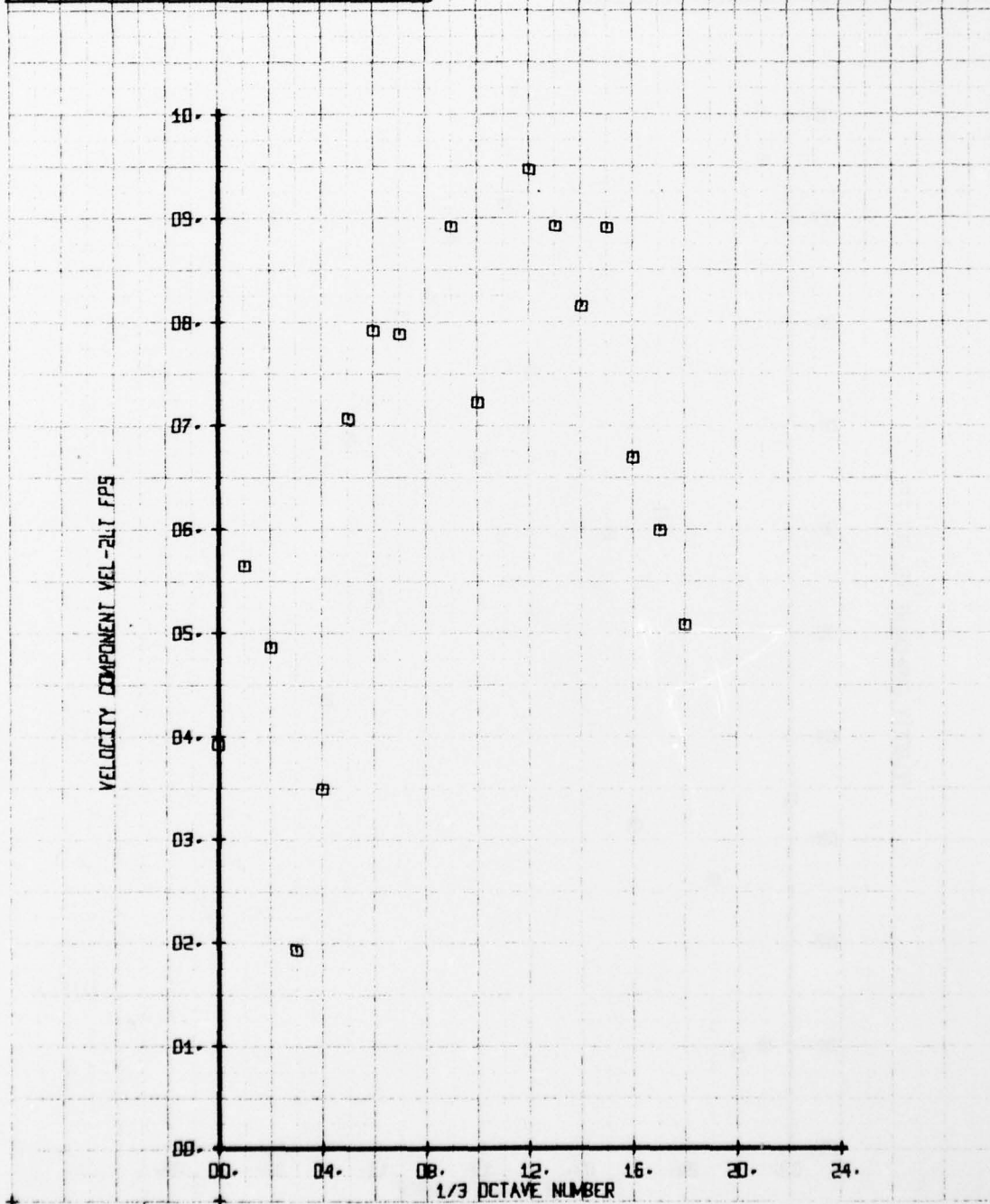
CH  
 72

LEGEND  
 PARAMETER  
 VEL-2LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 3

LEGEND  
 SYM CH PARAMETER  
 □ 72 VEL-2LT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 4

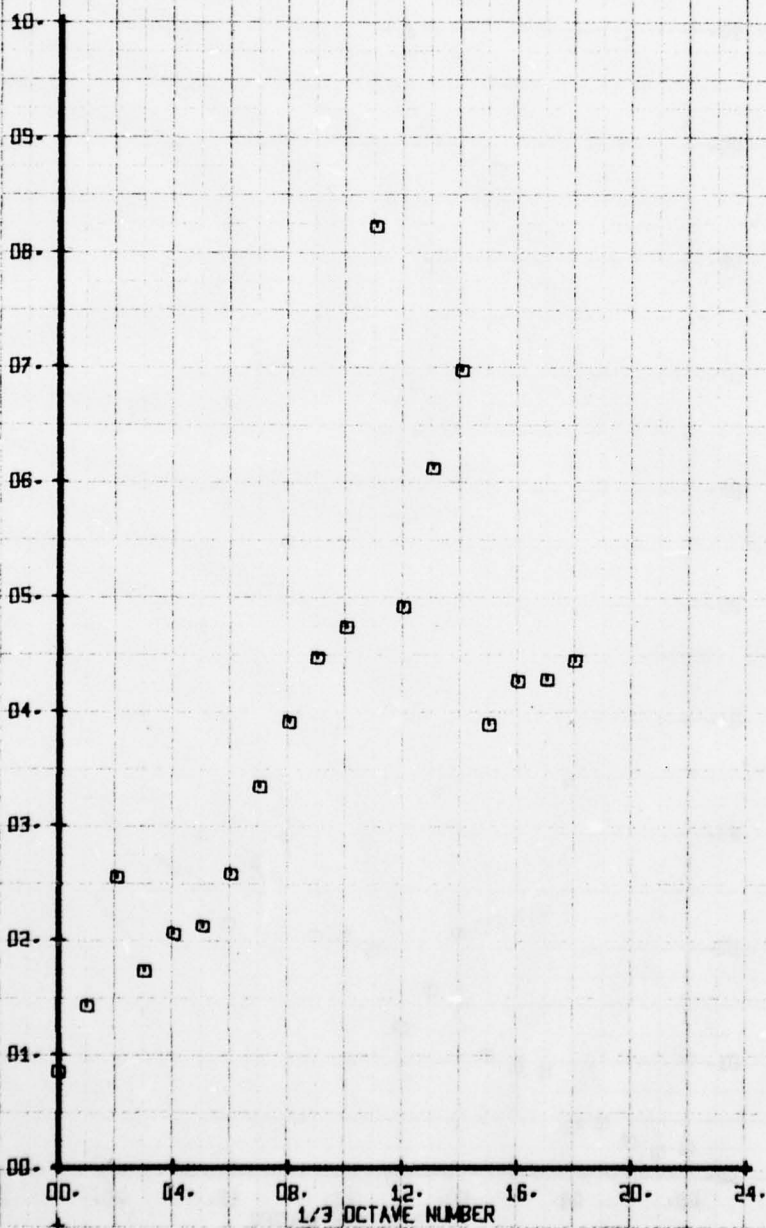
SYM  
 0

LEGEND

CH  
 72

PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS





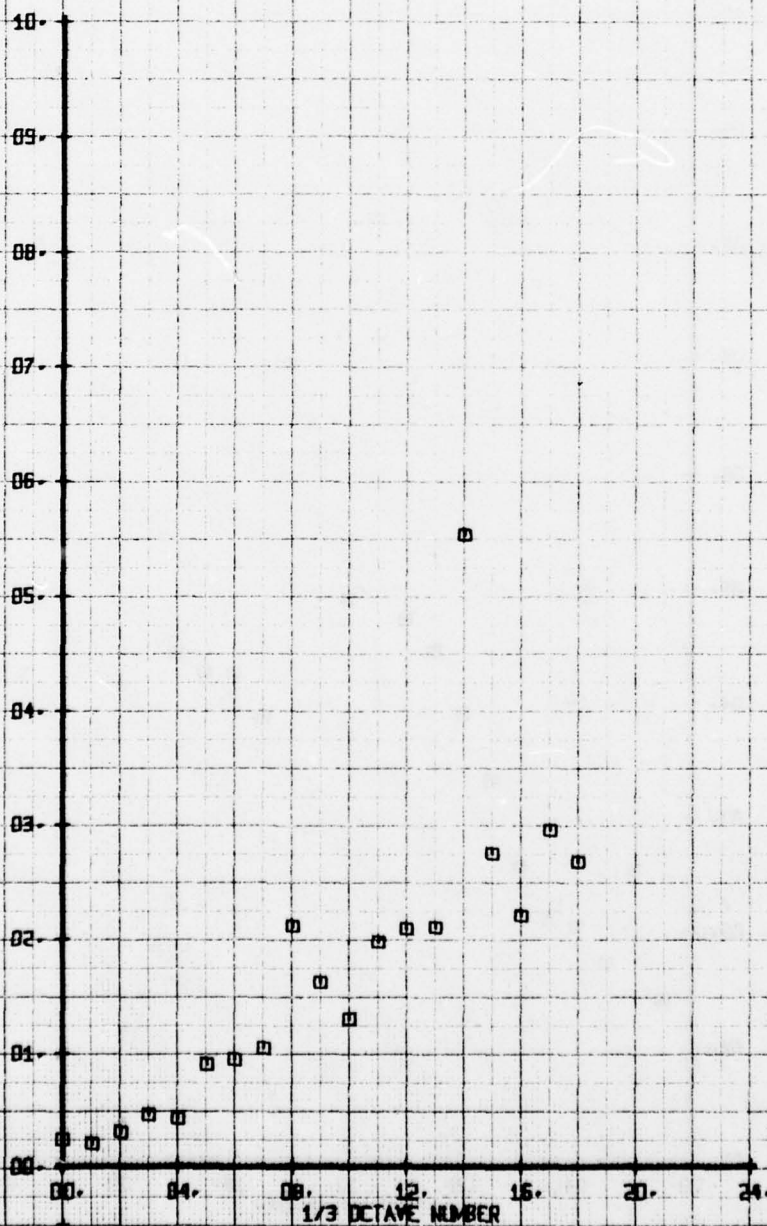
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 5

SYM  
 □

CH.  
 72

LEGEND  
 PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT EPS

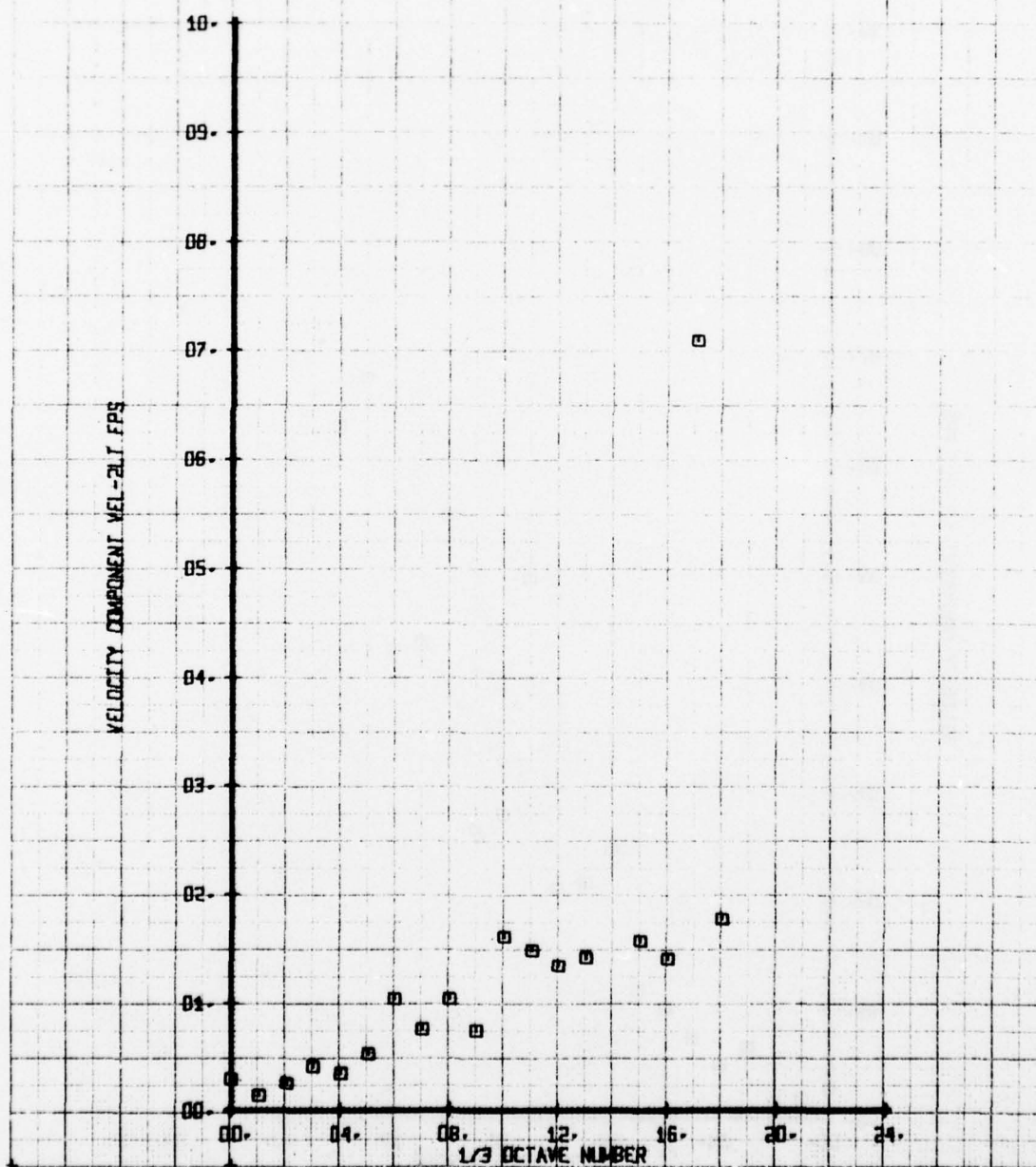


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 6

SYM  
 □

CH  
 72

LEGEND  
 PARAMETER  
 VEL-2LT



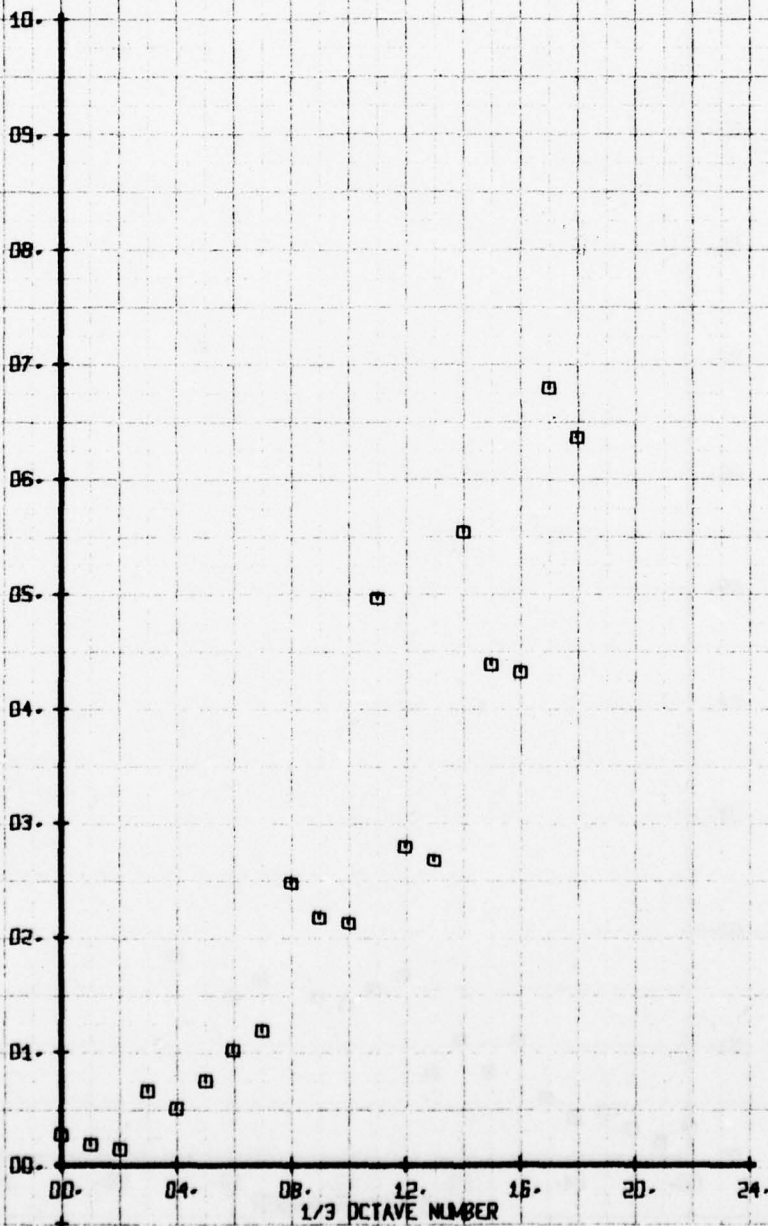
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 7

SYM  
 0

CH  
 72

LEGEND  
 PARAMETER  
 VEL-ZLT

VELOCITY COMPONENT VEL-ZLT FPS

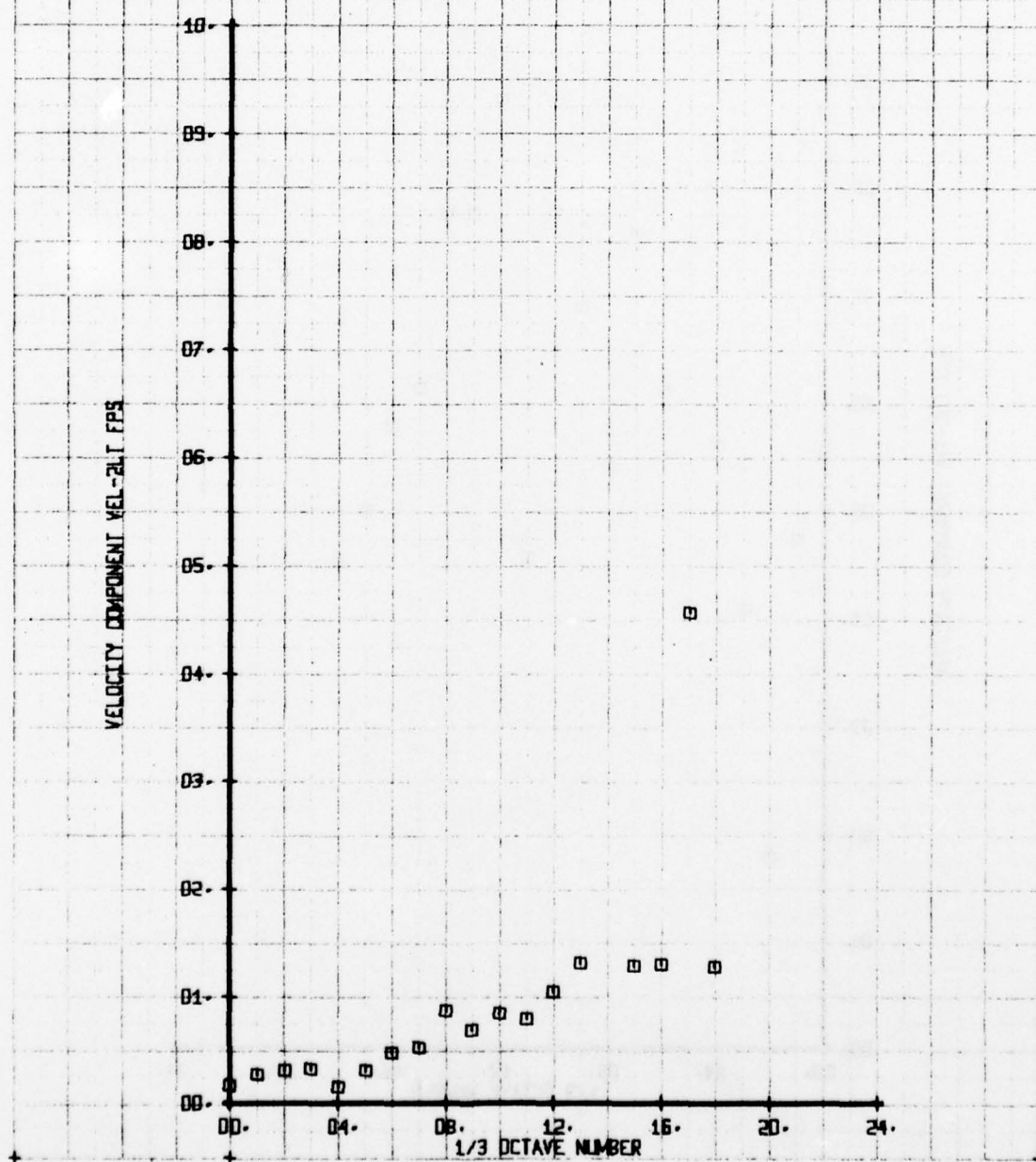


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 8

SYM  
 0

CH  
 72

LEGEND  
 PARAMETER  
 VEL-2LT





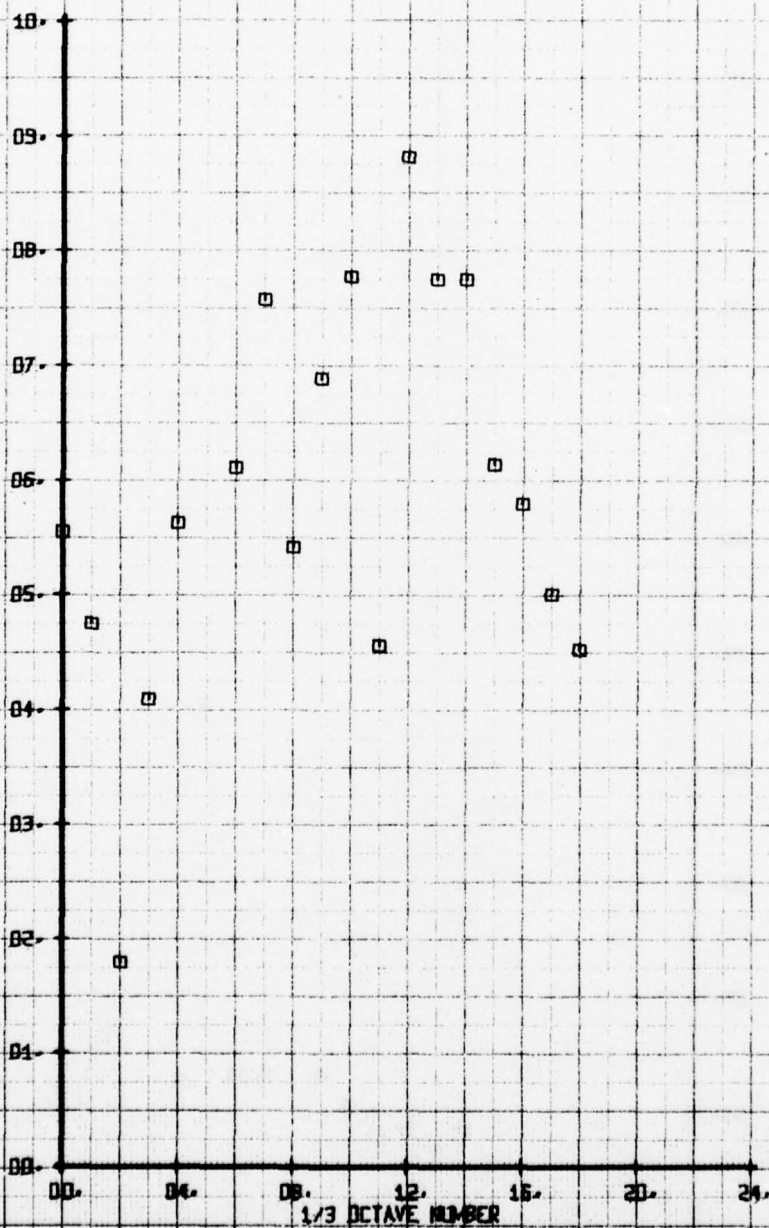
HOT FILM WAVE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 2

SYM  
 □

CH  
 70

LEGEND  
 PARAMETER  
 VEL-3LT

VELOCITY COMPONENT VEL-3LT FPS



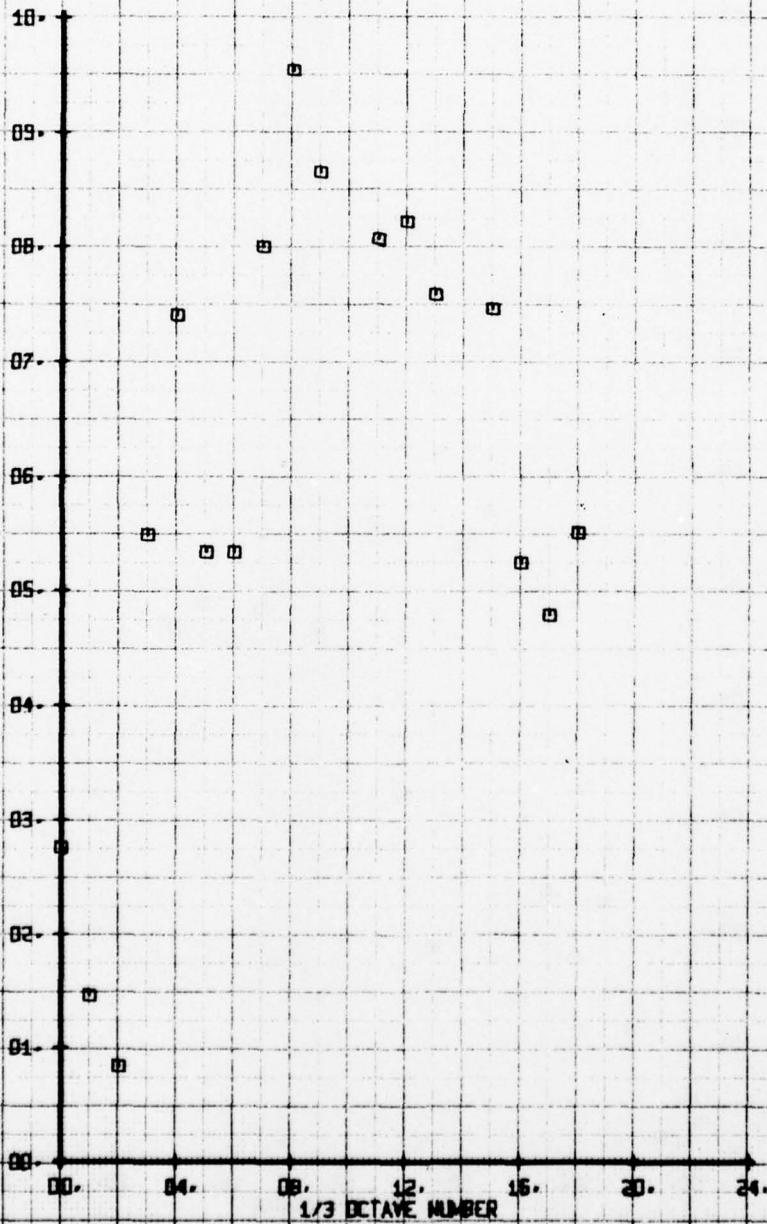
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE-HUB WITH STIFF PITCH ARMS  
 RUN 156 TP 3

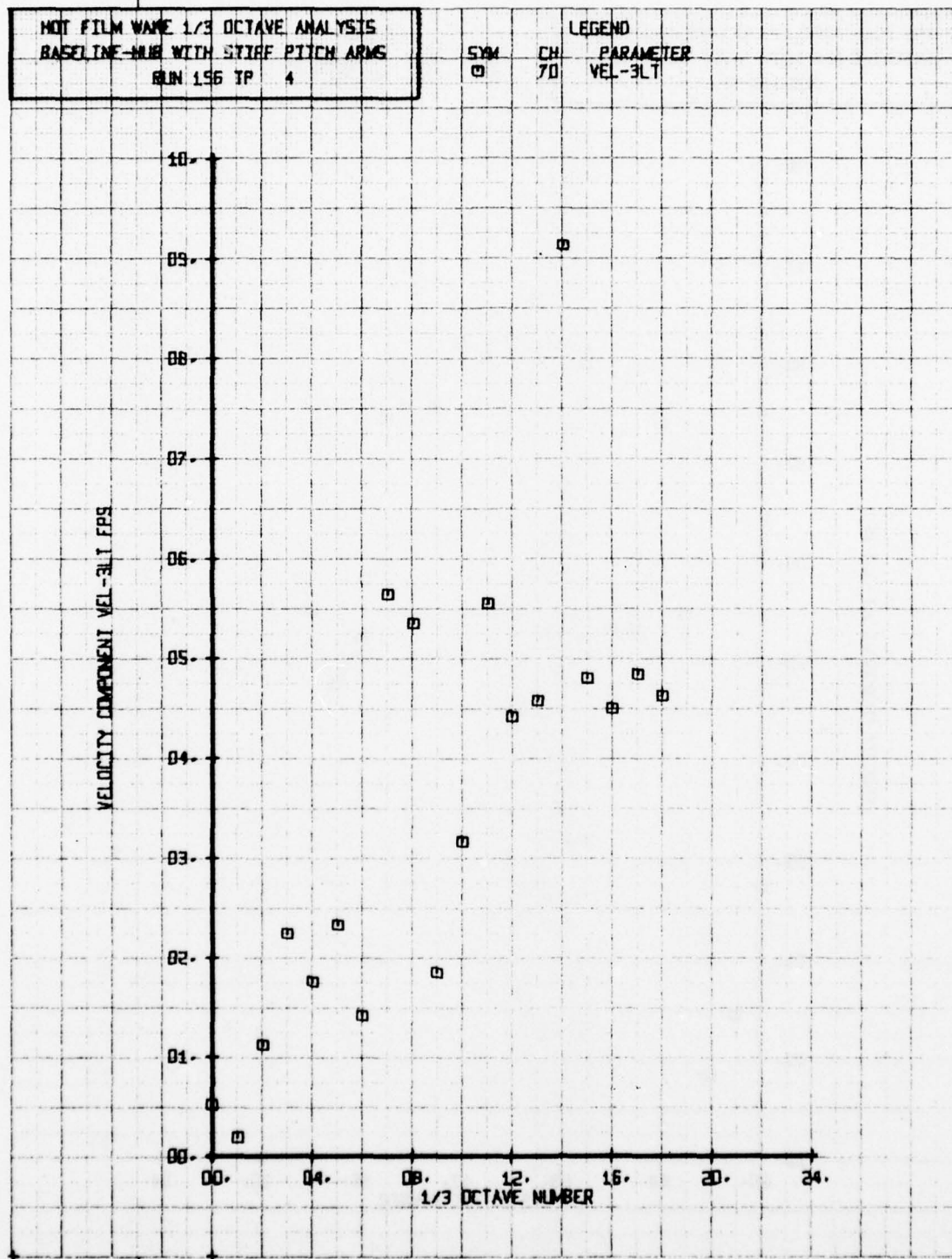
SYM  
 □

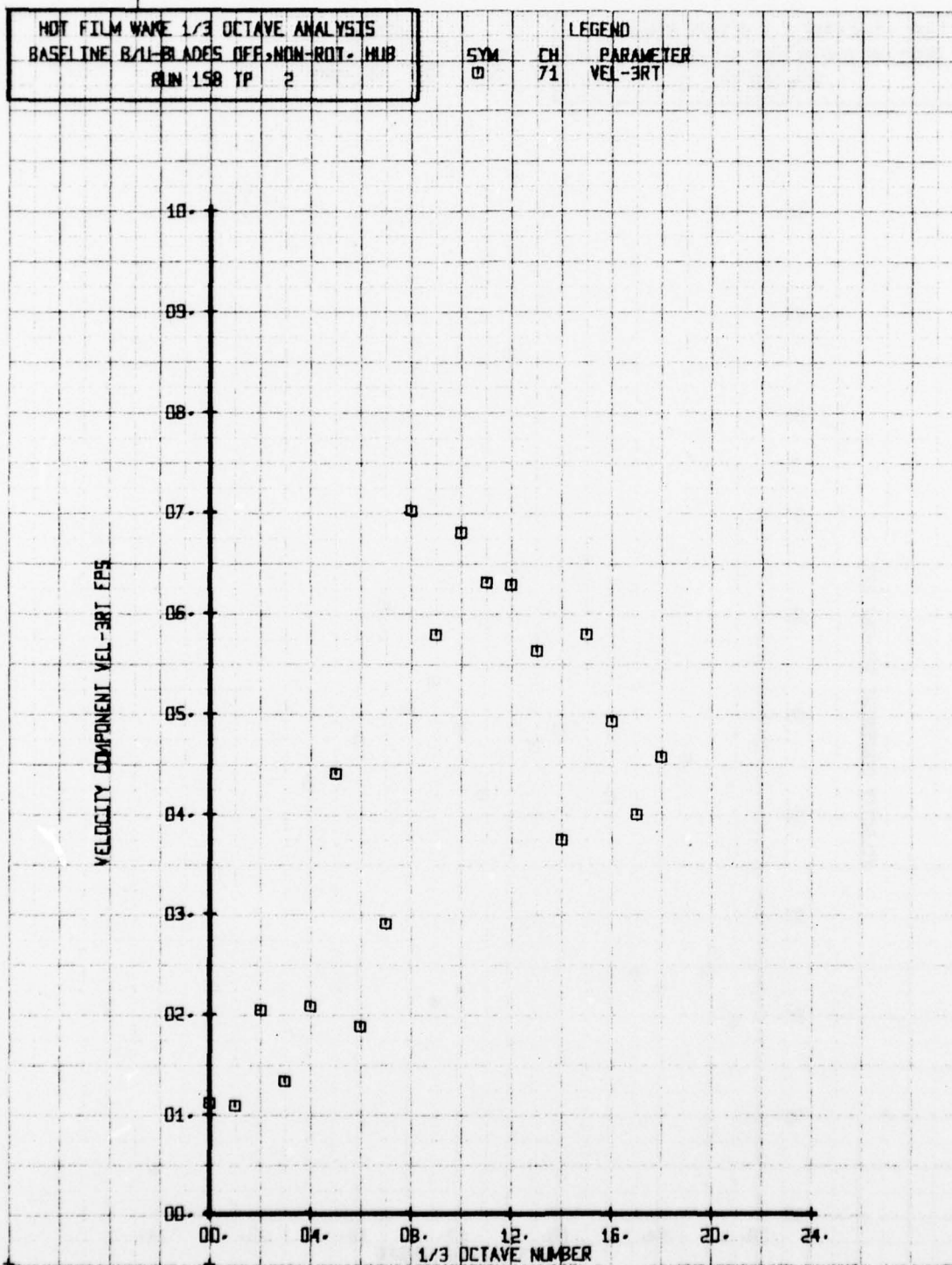
CH  
 70

LEGEND  
 PARAMETER  
 VEL-3LT

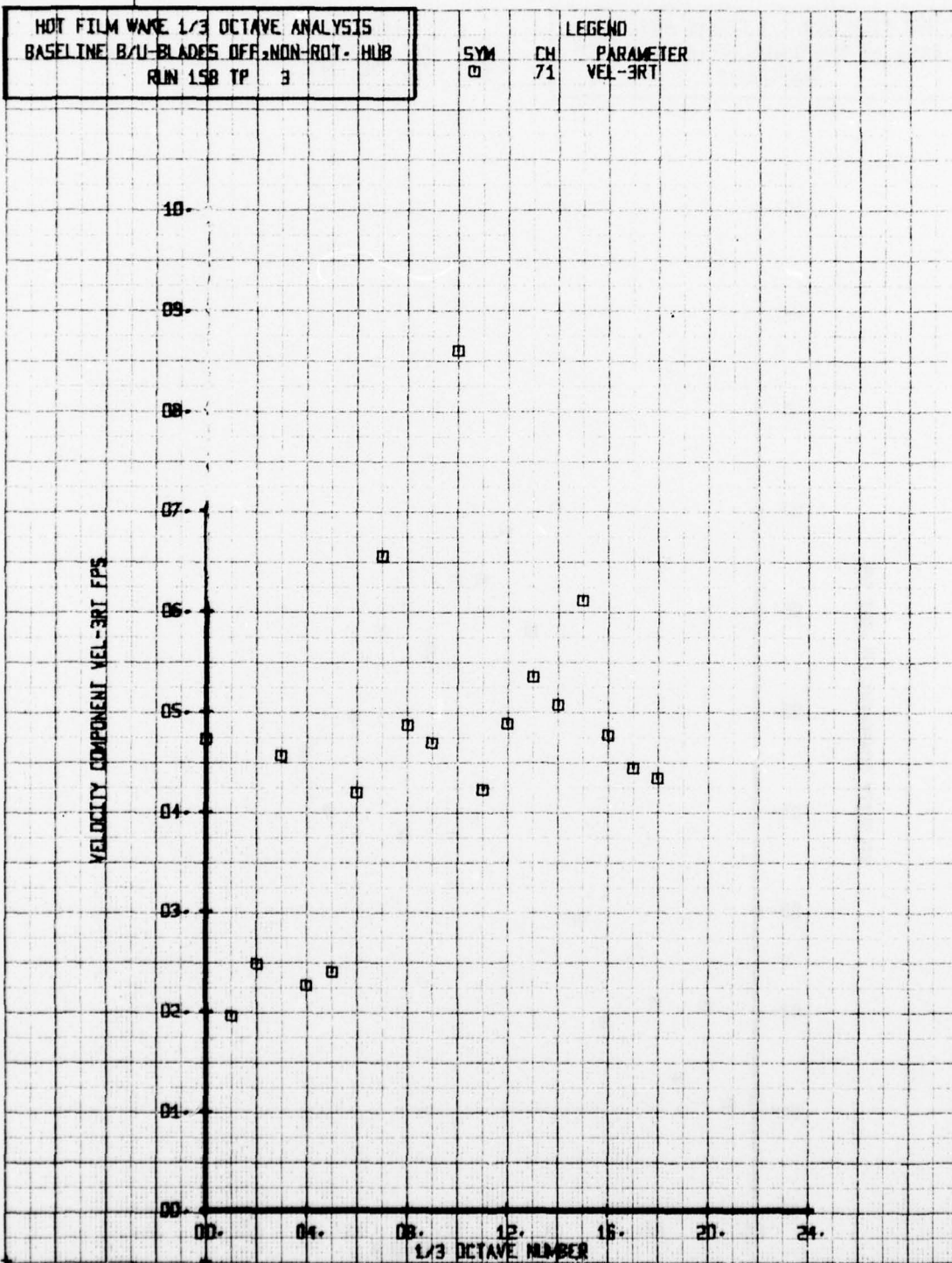
VELOCITY COMPONENT VEL-3LT FPS











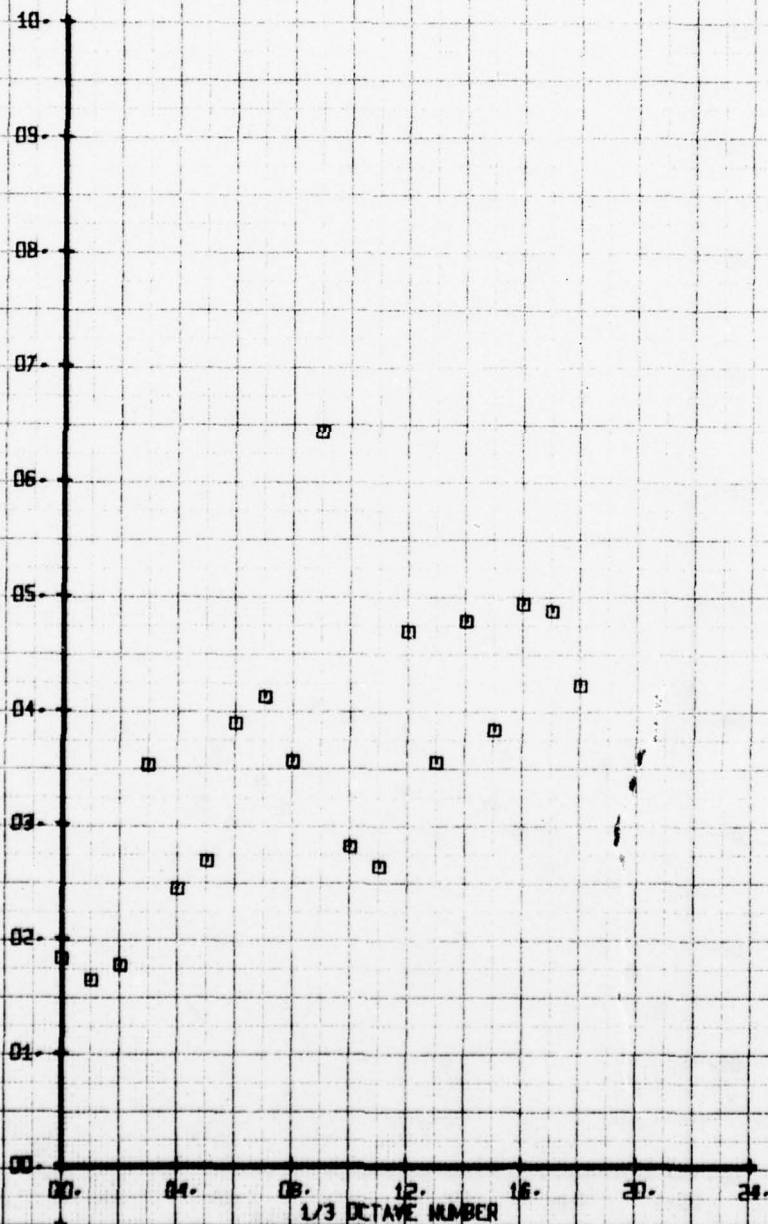
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 4

SYM  
 0

CH  
 71

LEGEND  
 PARAMETER  
 VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS

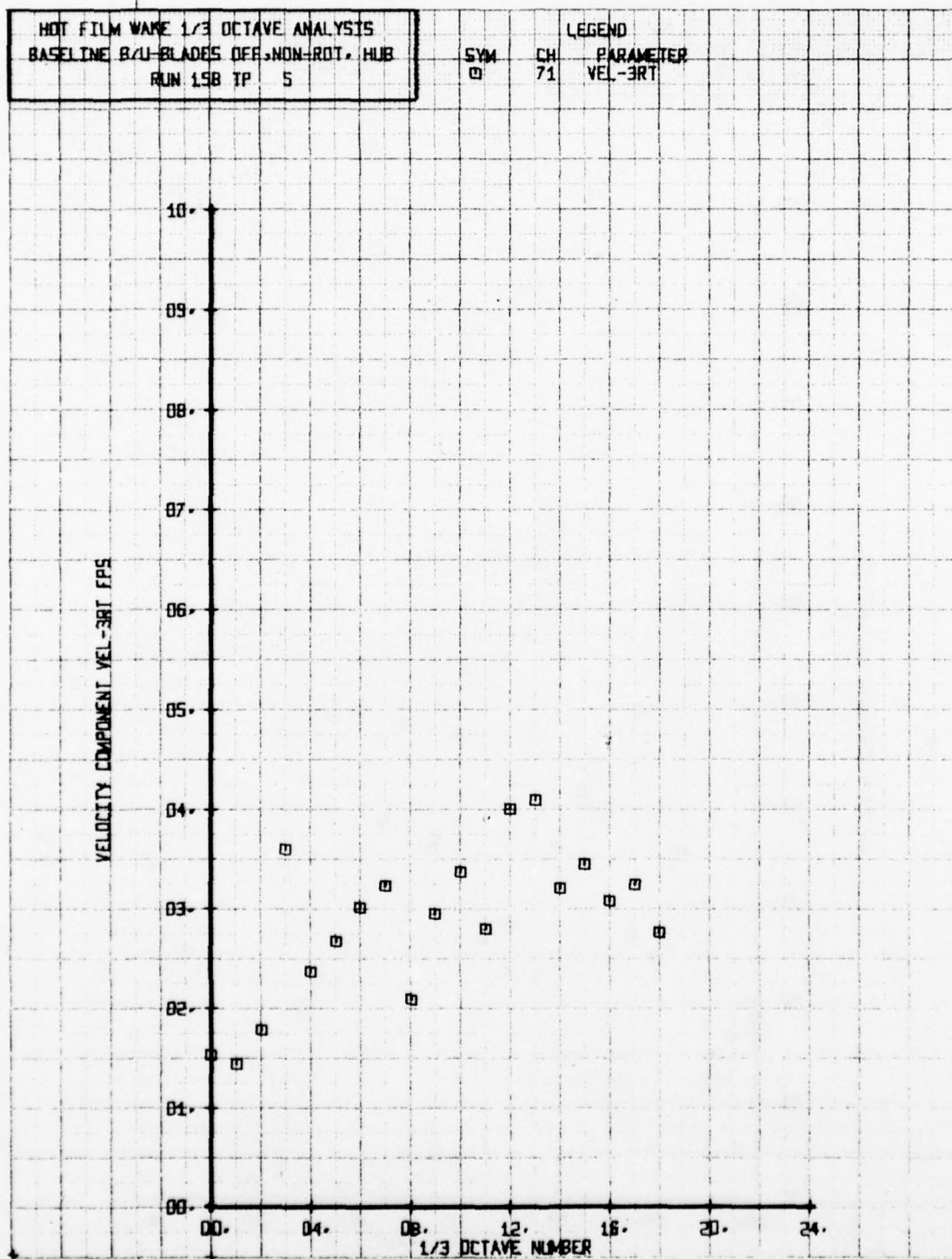


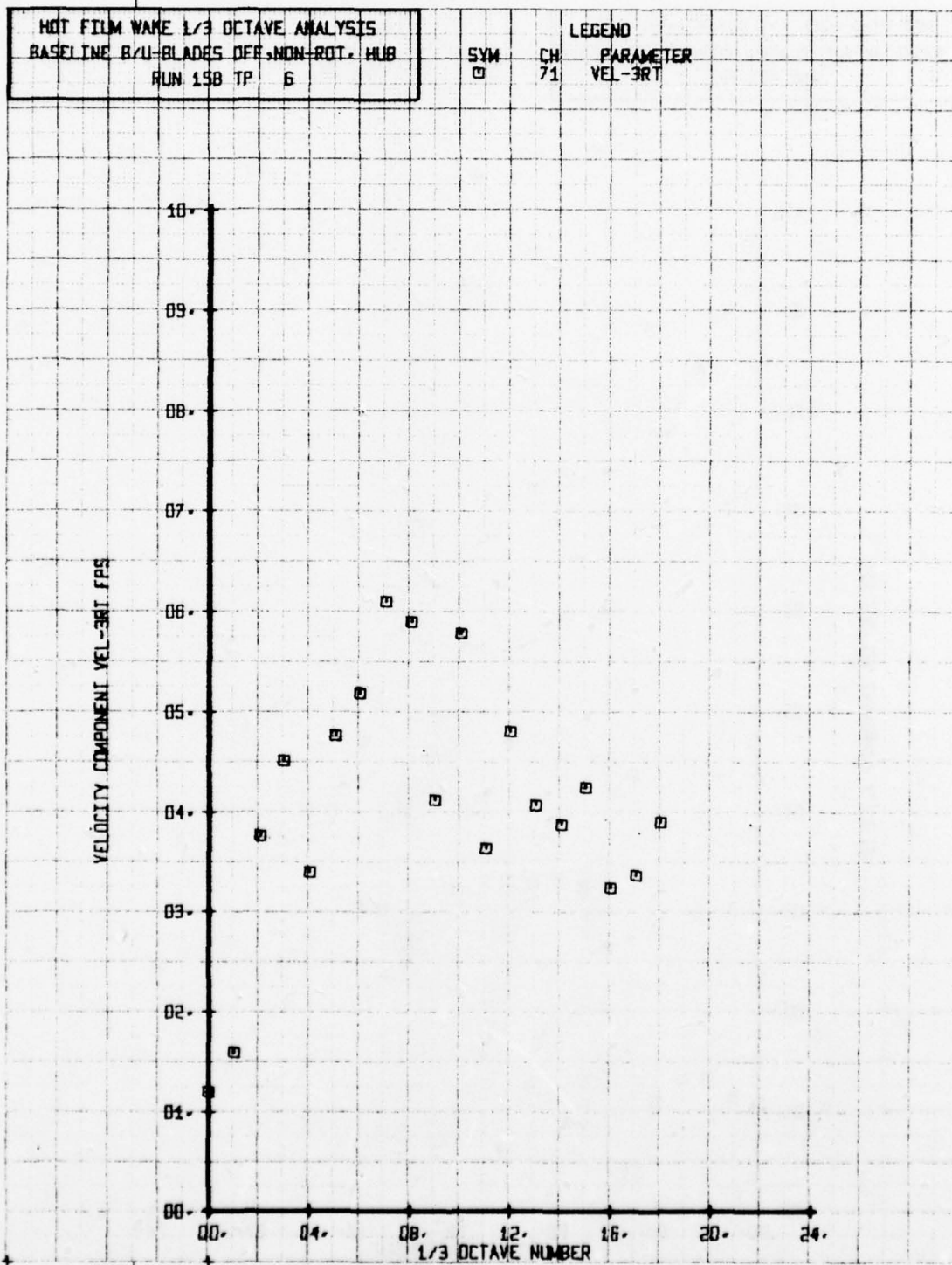
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 5

SYM  
 □

CH  
 71

LEGEND  
 PARAMETER  
 VEL-3RT







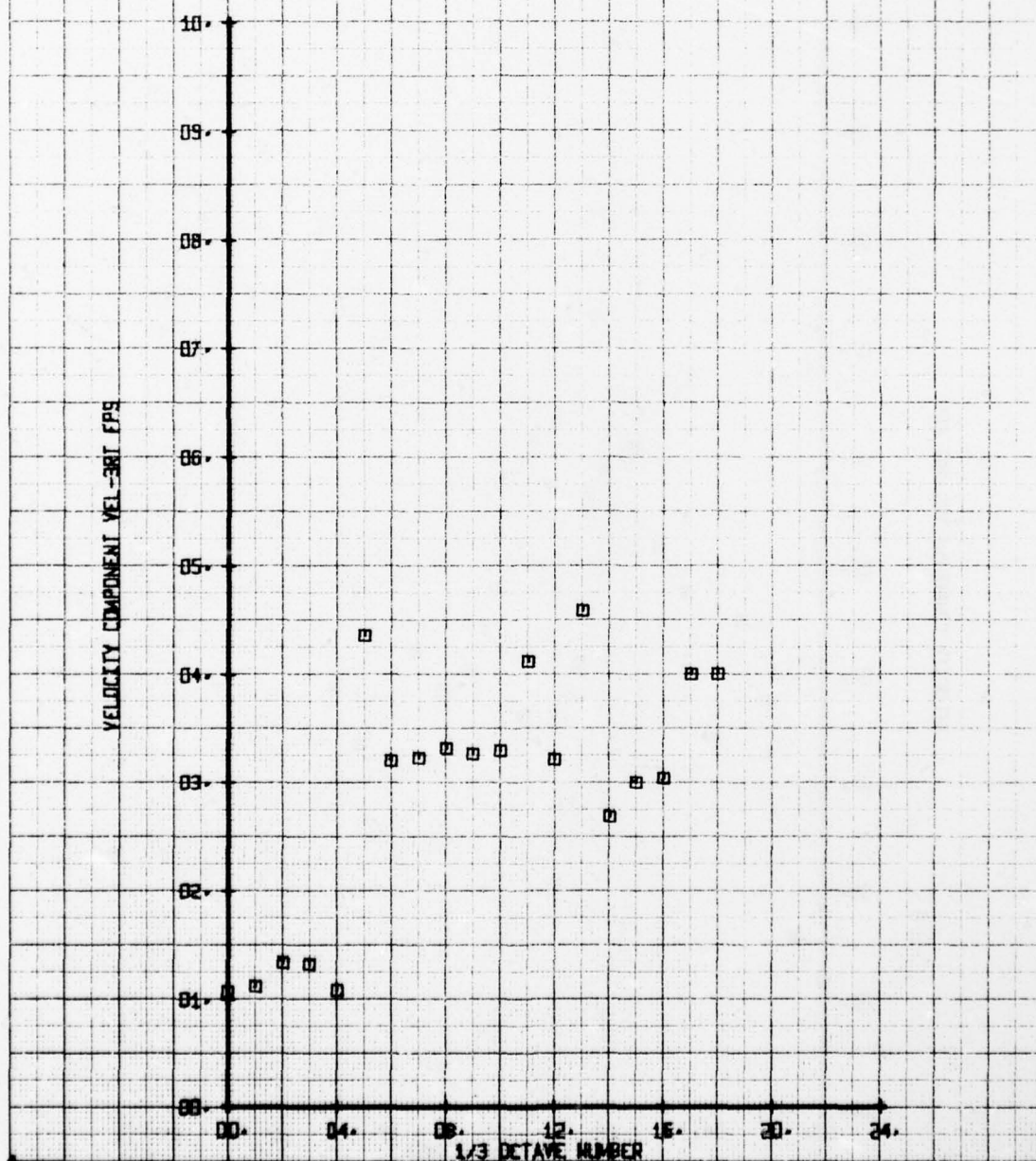
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-BLADES OFF, NON-ROT, HUB  
 RUN 158 TP 7

SYM  
 □

CH  
 71

LEGEND  
 PARAMETER  
 VEL-3RT

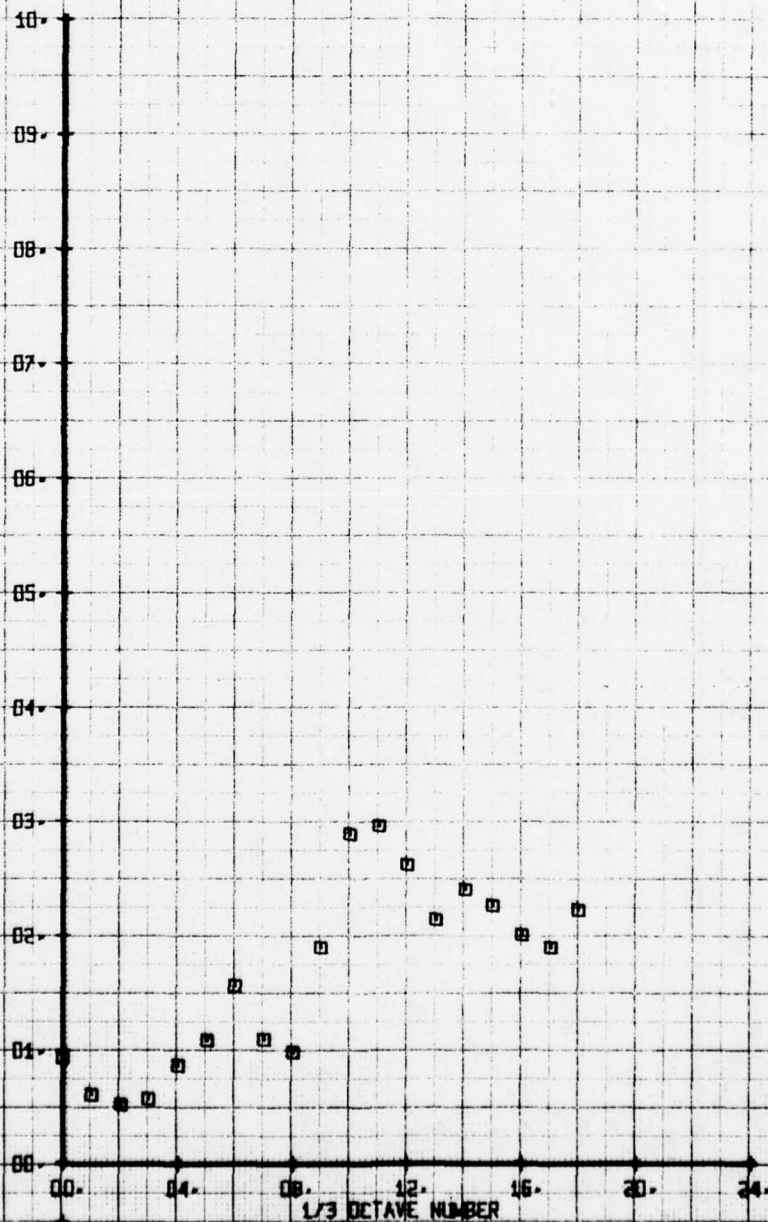
VELOCITY COMPONENT VEL-3RT EPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP B

SYM CH PARAMETER  
 □ 71 VEL-3RT

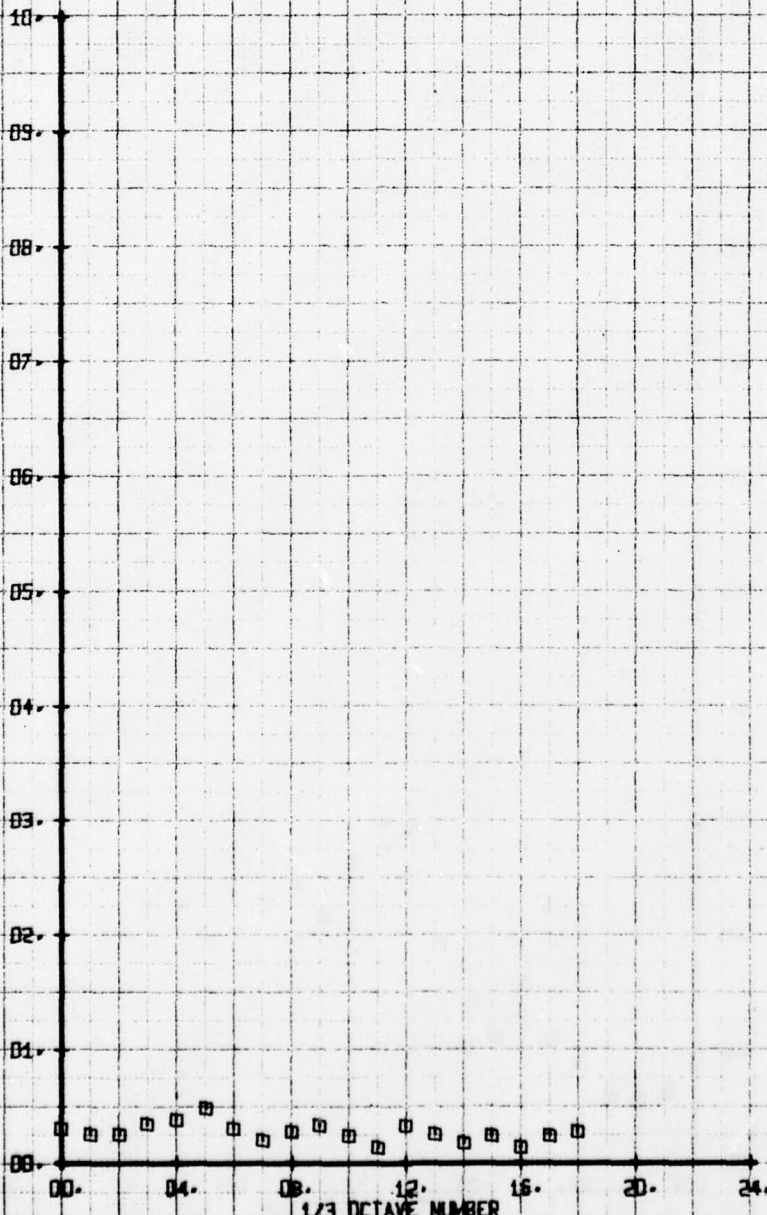
VELOCITY COMPONENT VEL-3RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 9

SYM	CH	LEGEND	PARAMETER
□	71		VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS



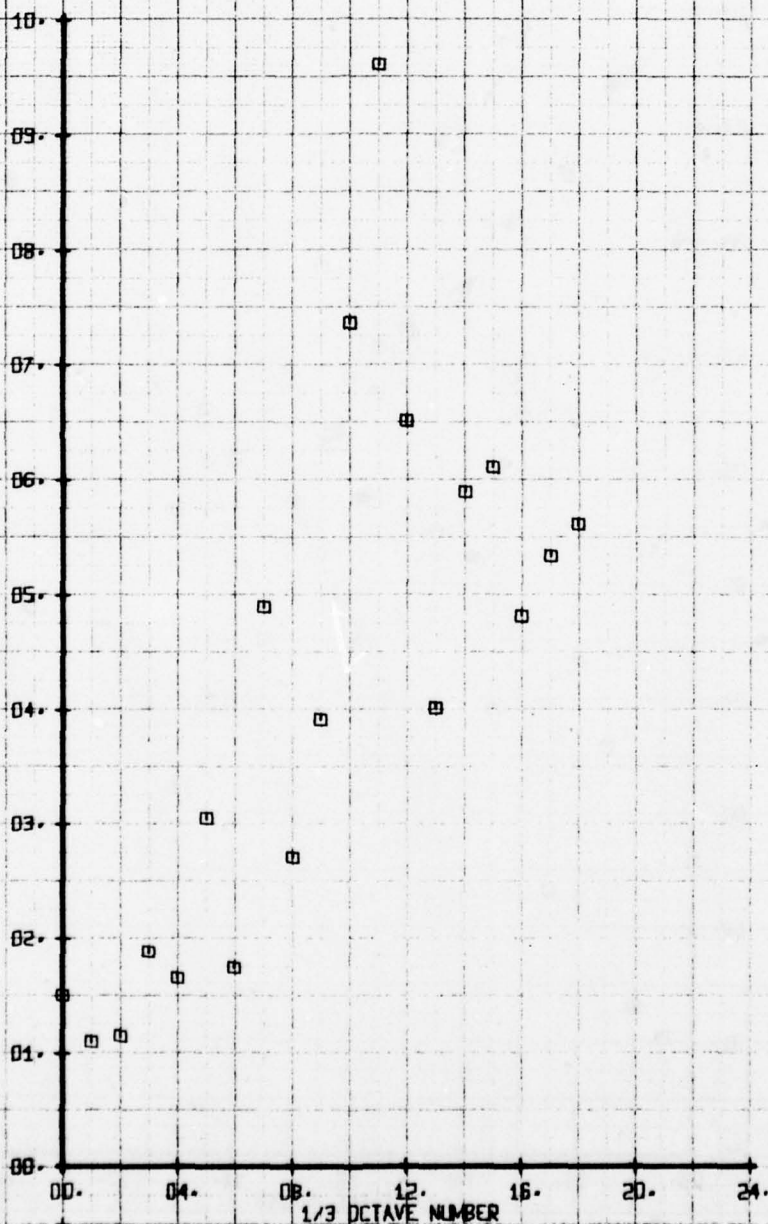
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 2

SYM  
 □

CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT

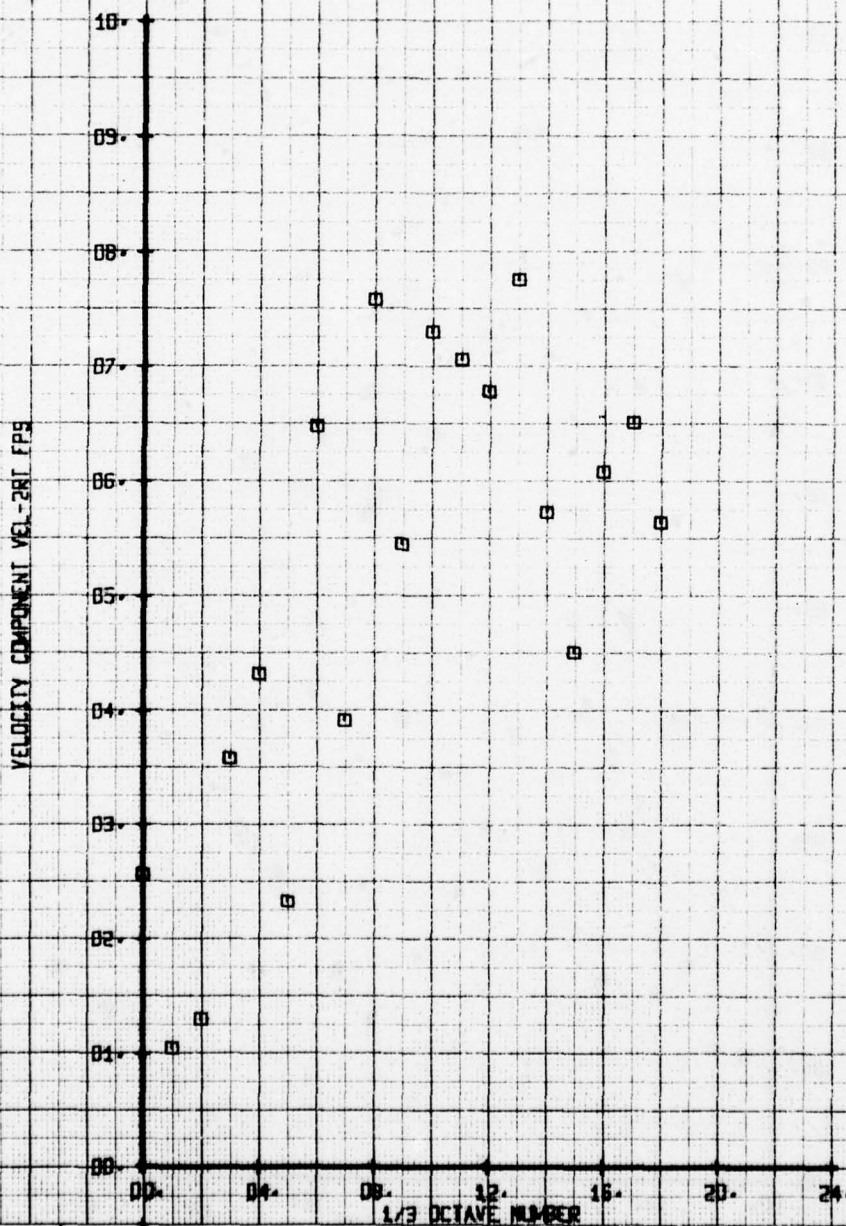
VELOCITY COMPONENT VEL-2RT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 3

SYM CH PARAMETER  
 □ 75 VEL-2RT



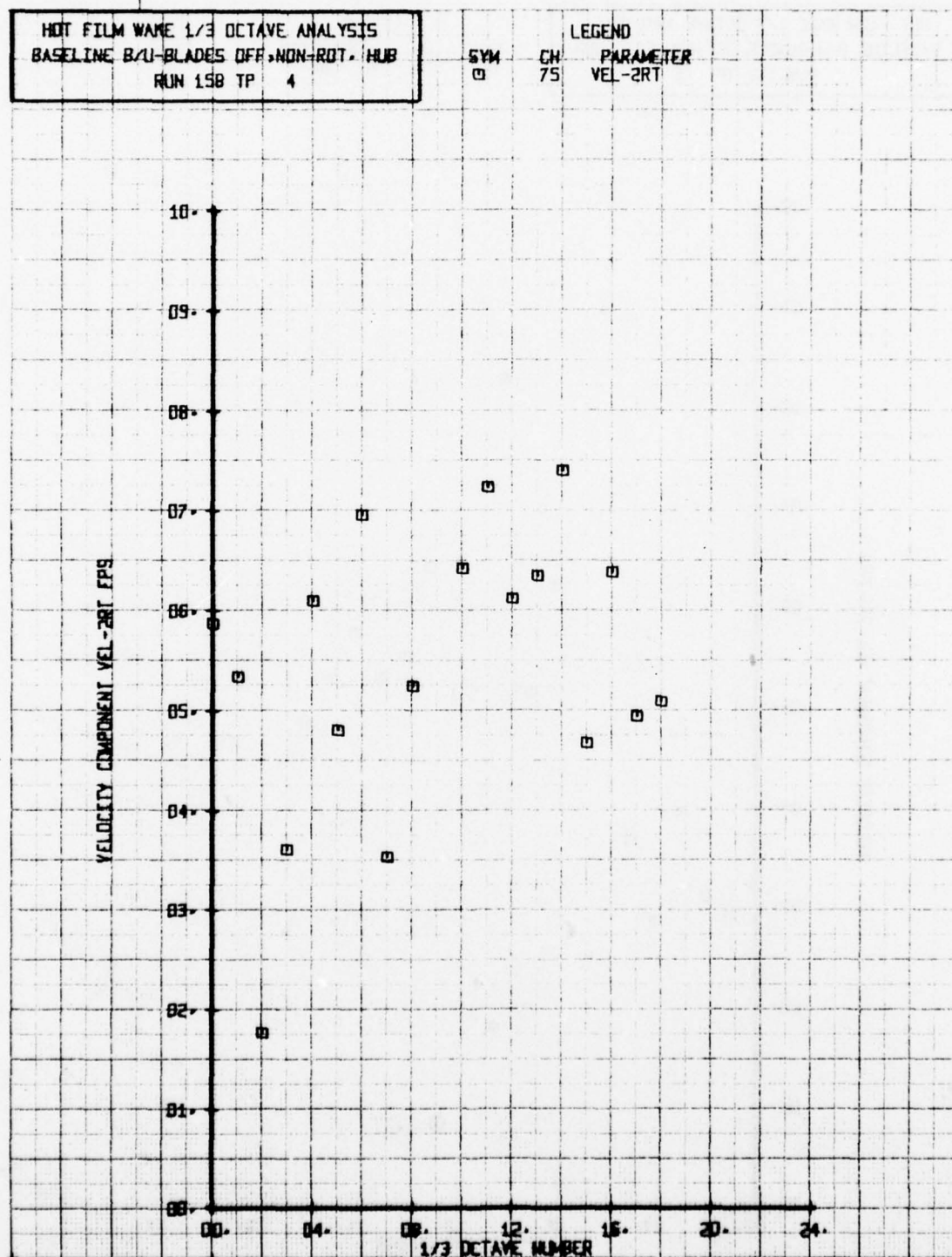
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 4

SYM  
 □

CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS

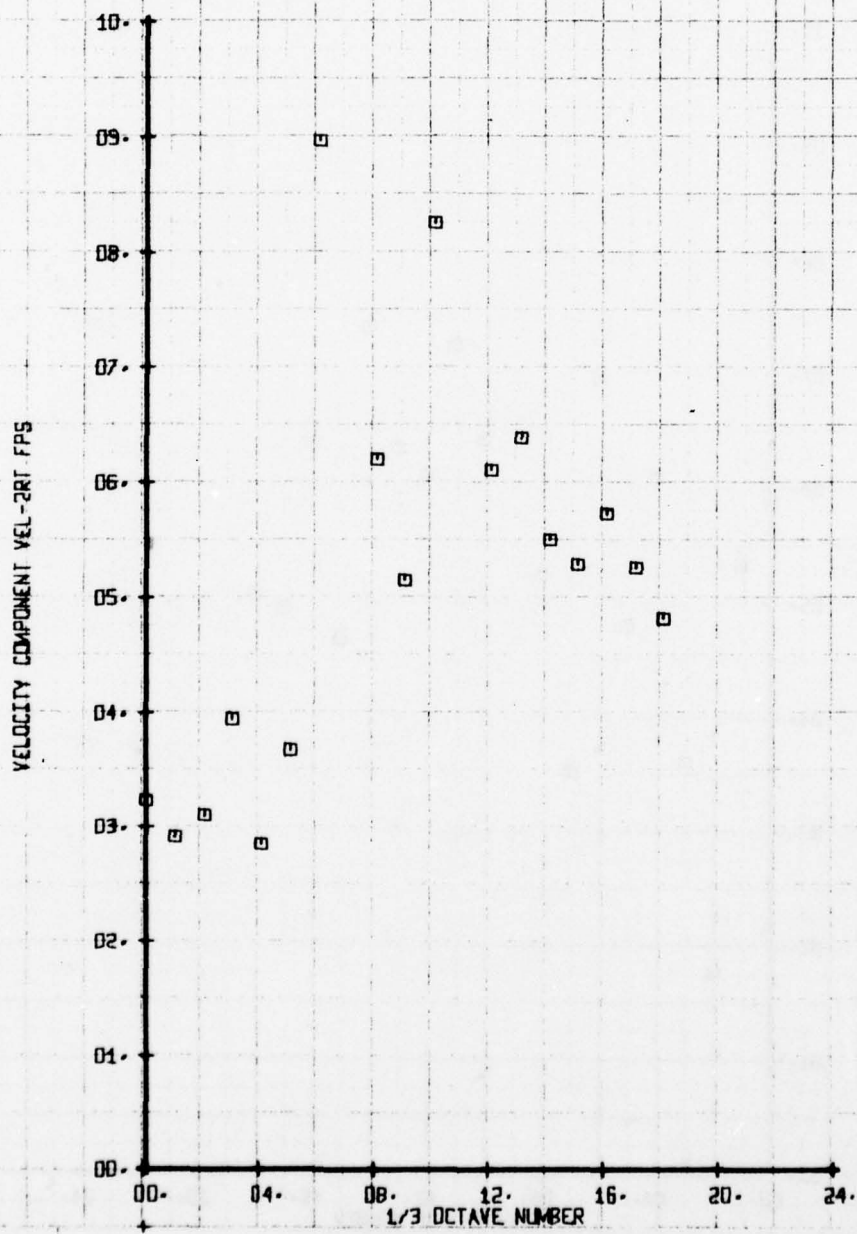


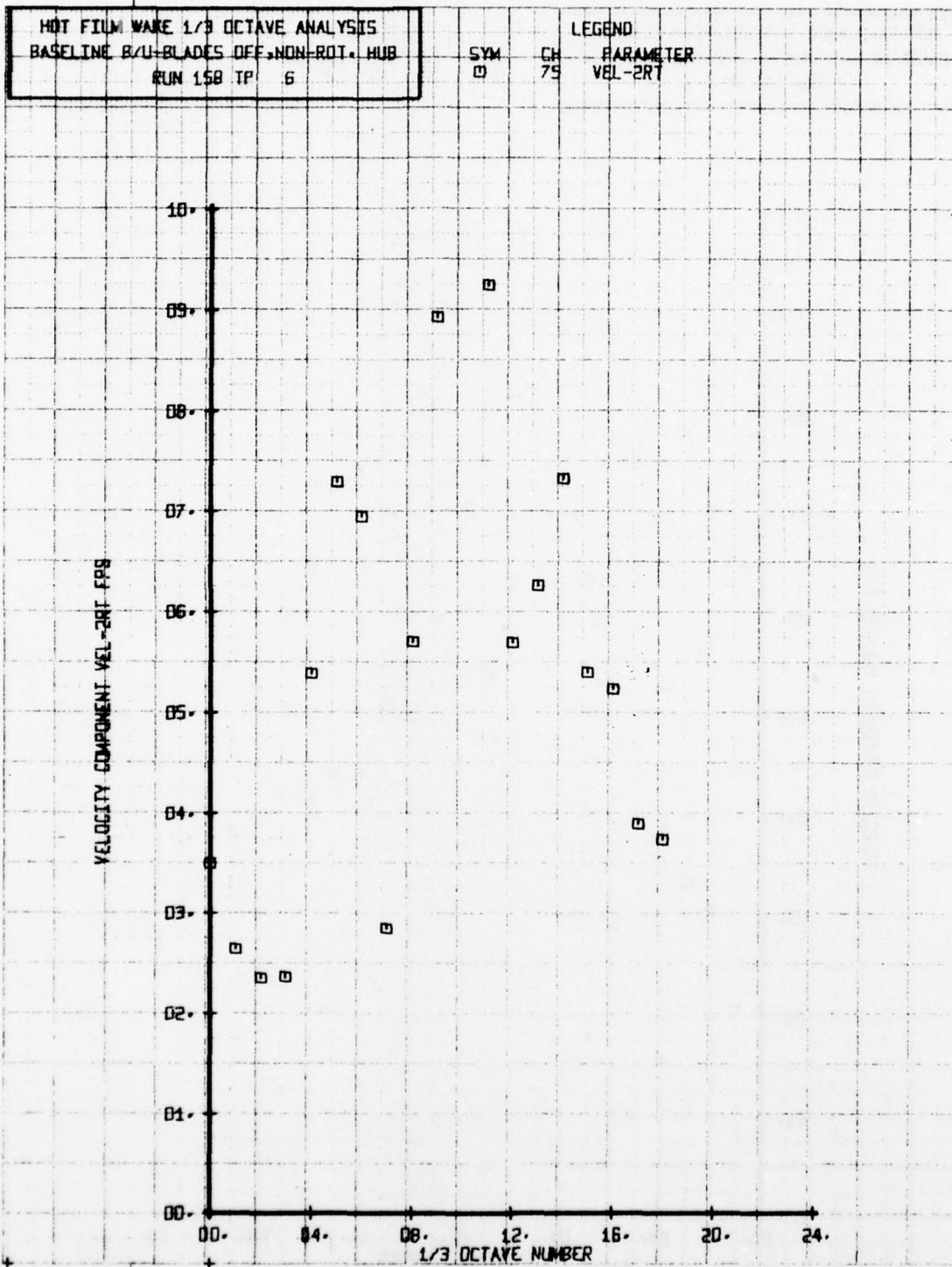
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 5

SYM  
 □

CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT

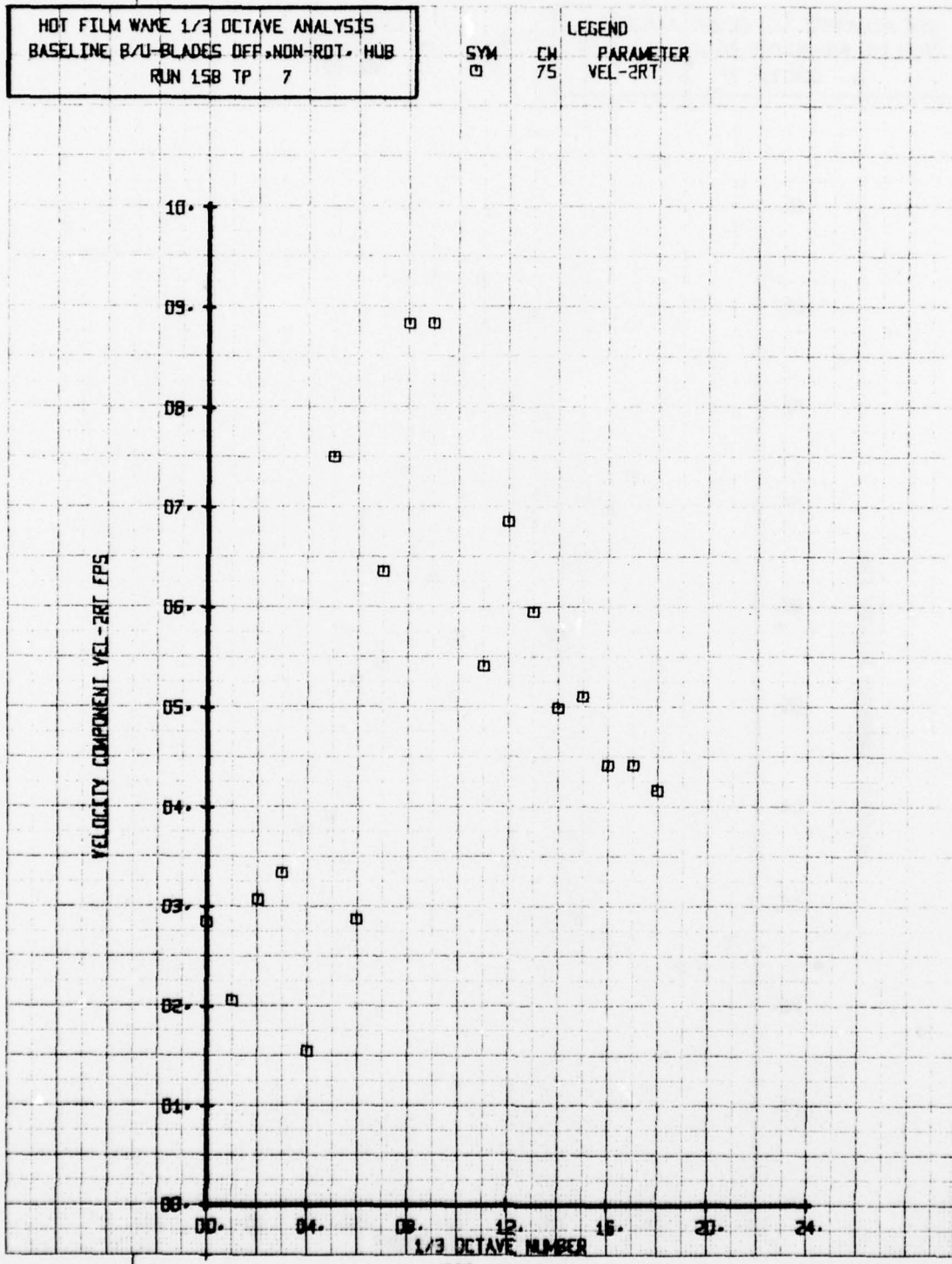






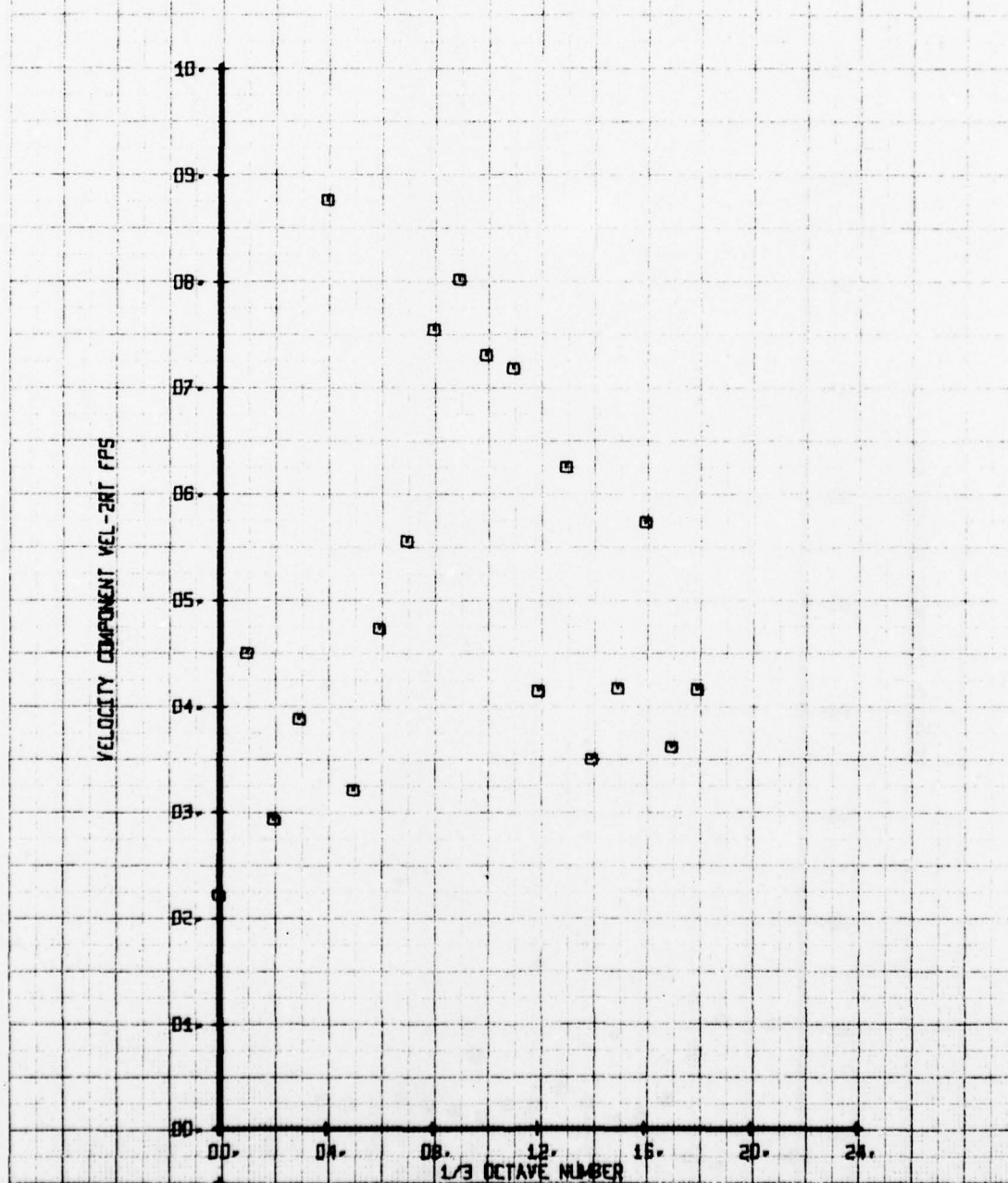
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 7

SYM CH PARAMETER  
 □ 75 VEL-2RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF-NDN-ROT. HUB  
 RUN 15B TP 8

LEGEND  
 SYM CH PARAMETER  
 □ 75 VEL-2RT



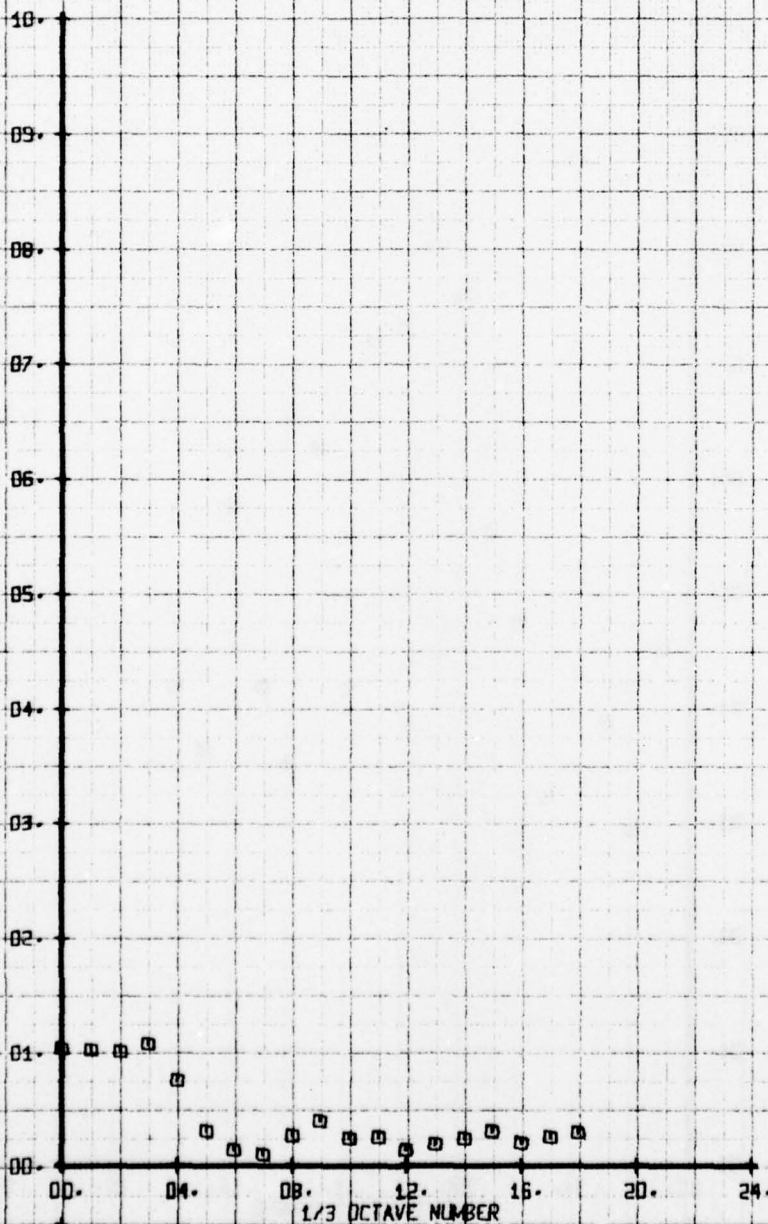
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 9

SYM  
 □

CH  
 75

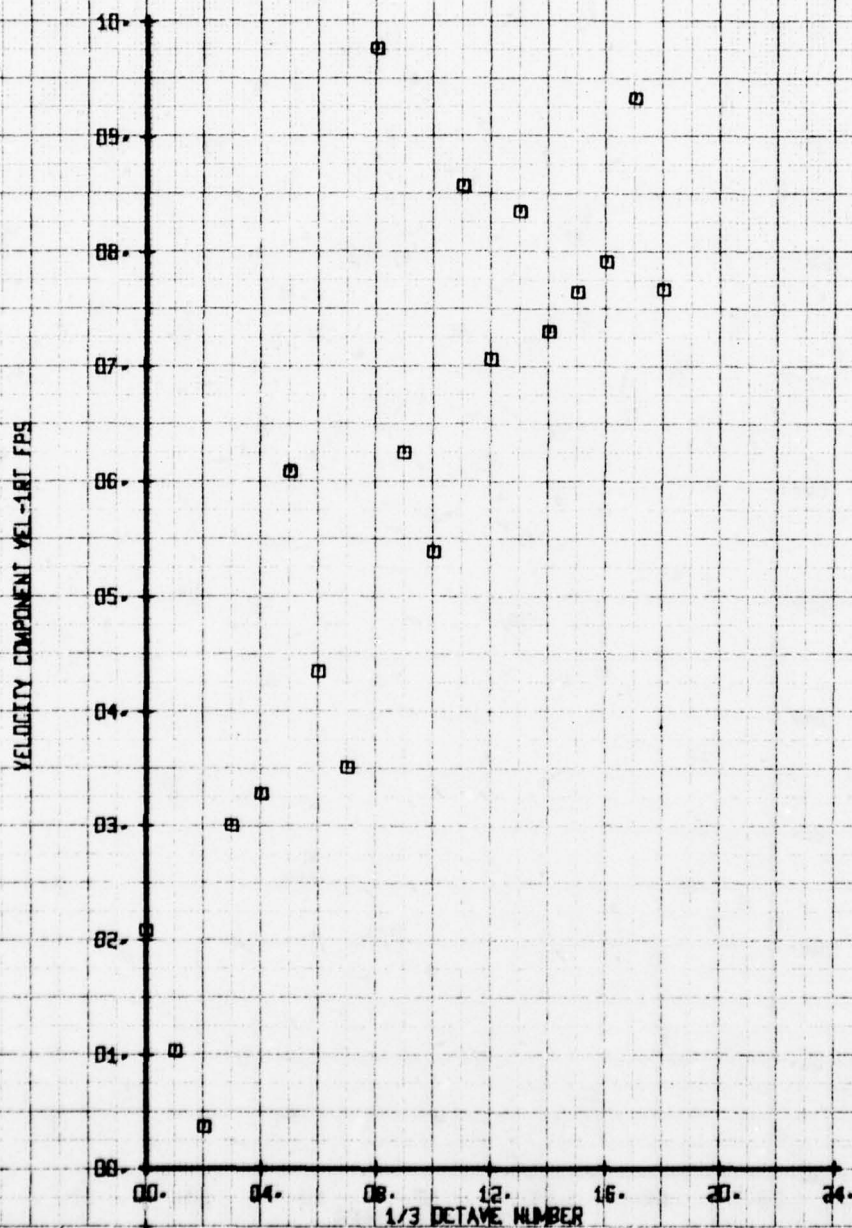
LEGEND  
 PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT EPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 2

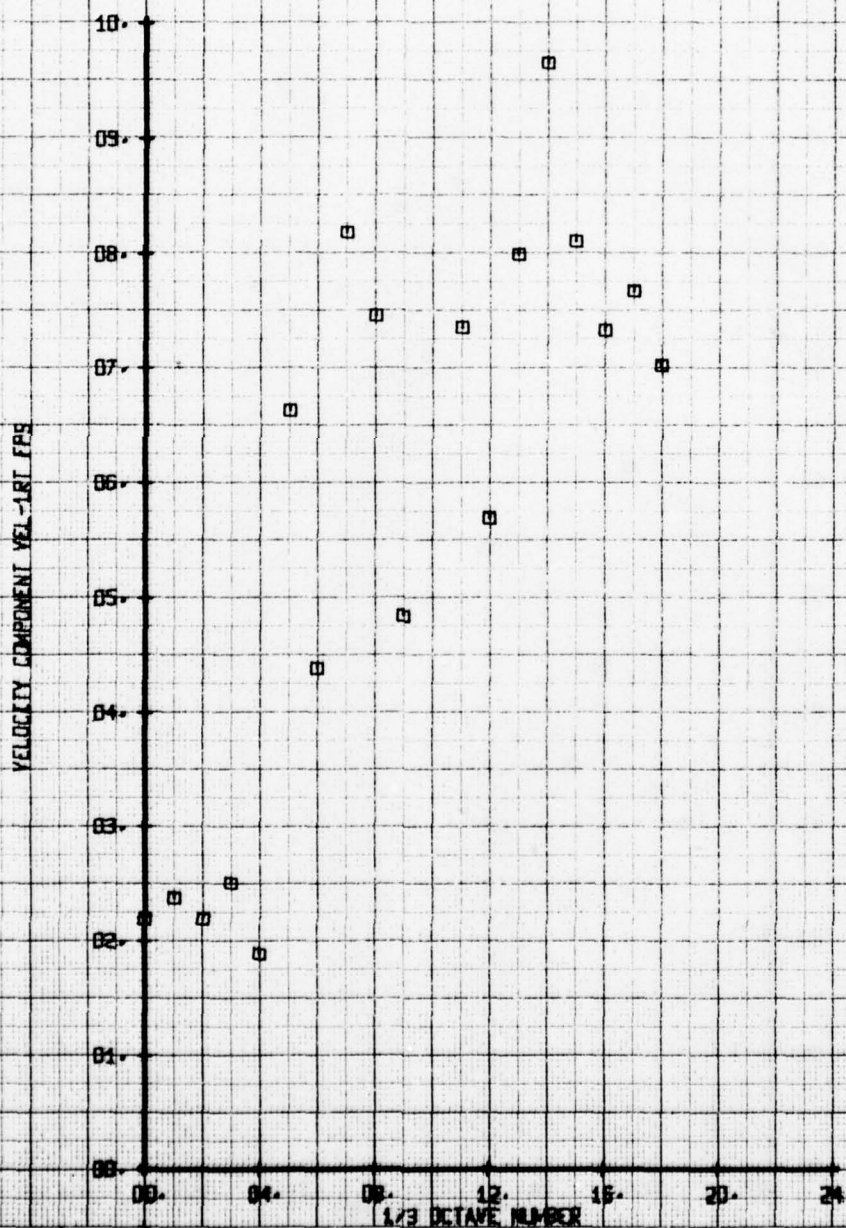
SYM CH PARAMETER  
 □ 74 VEL-1RT

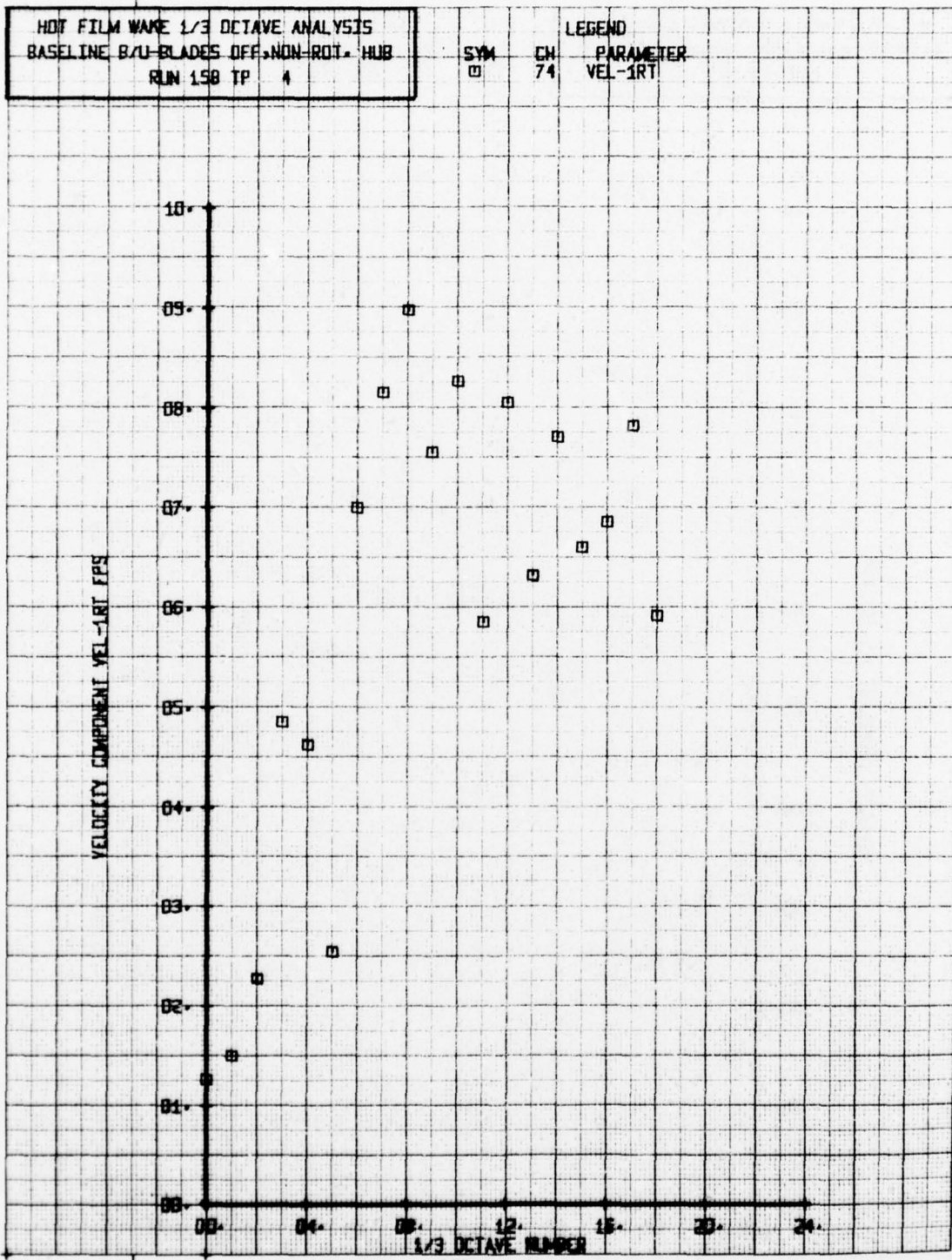




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT, HUB  
 RUN 158 TP 3

LEGEND  
 SYM CH PARAMETER  
 □ 74 VEL-1RT

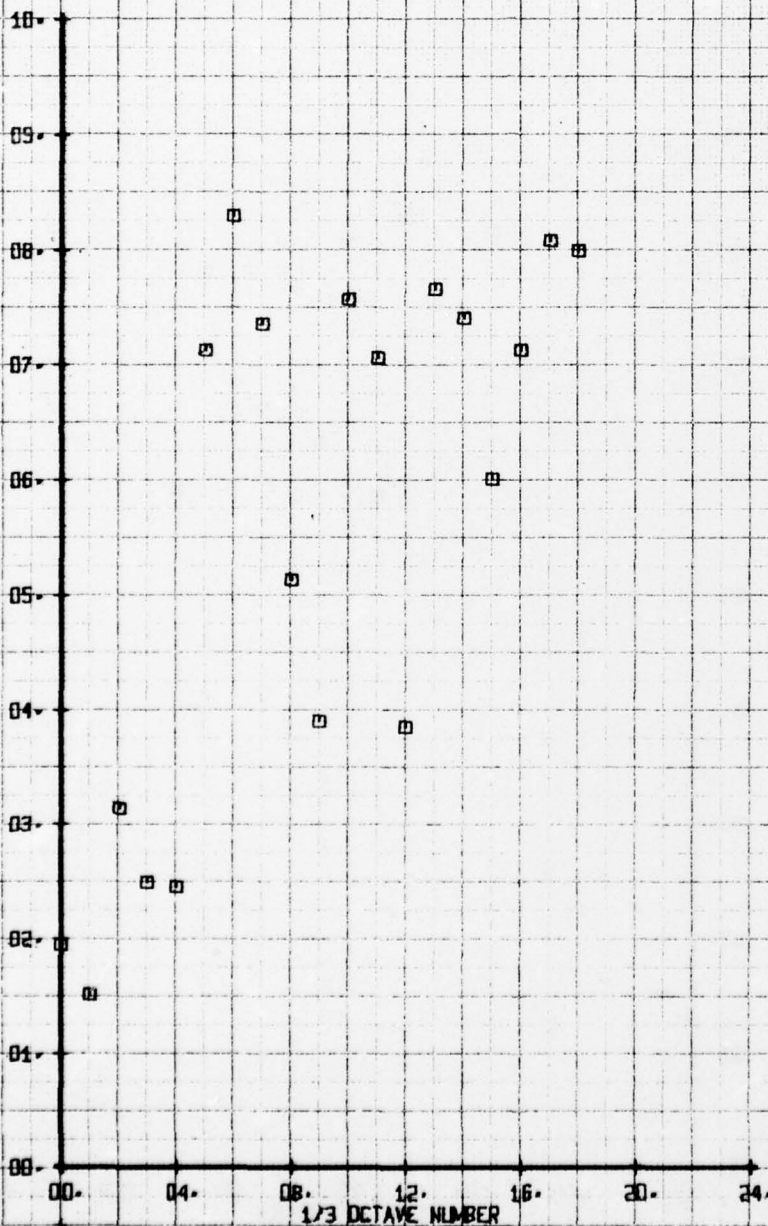




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 5

SYM CH PARAMETER  
 □ 74 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS



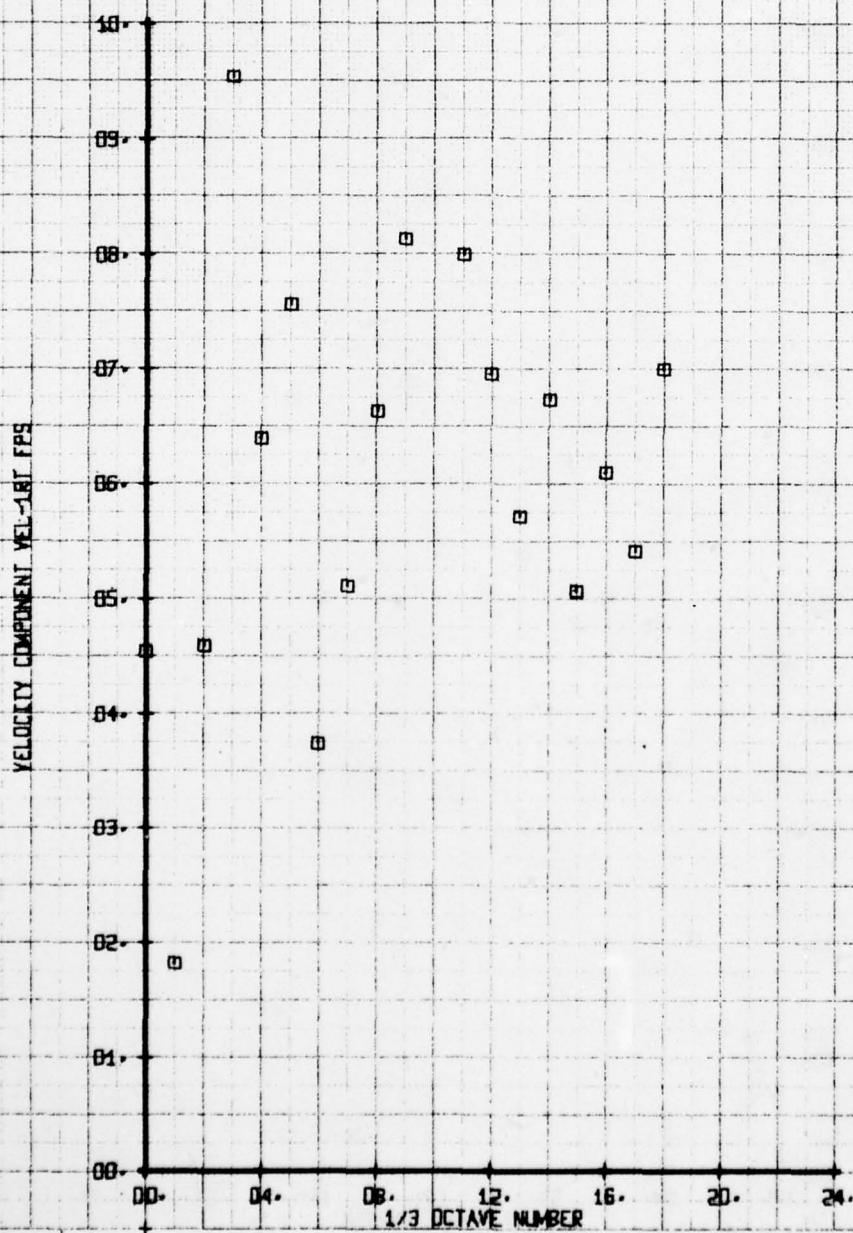


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 6

SYM  
 □

LEGEND

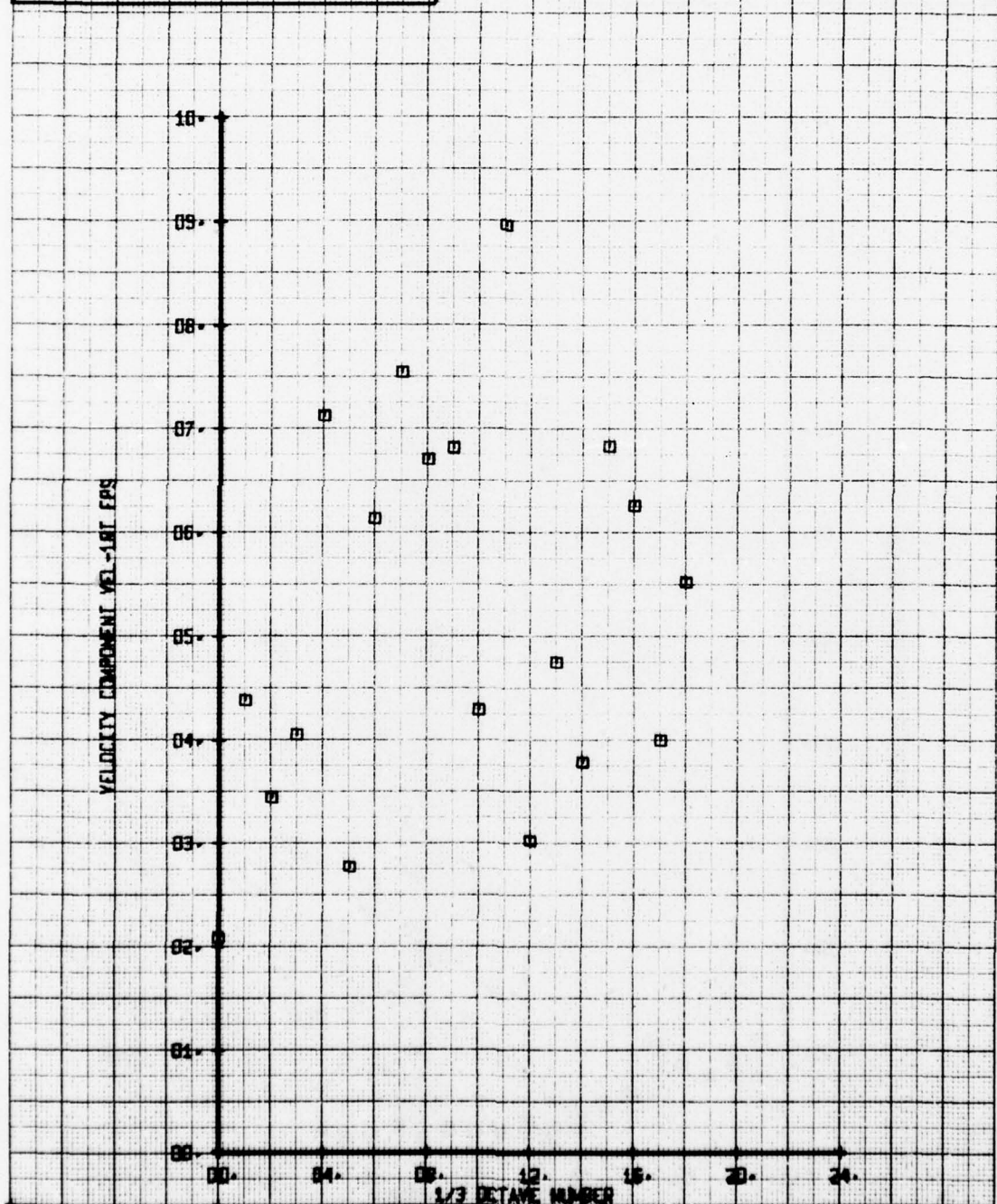
CH 74  
 PARAMETER  
 VEL-1RT





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11 BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 8

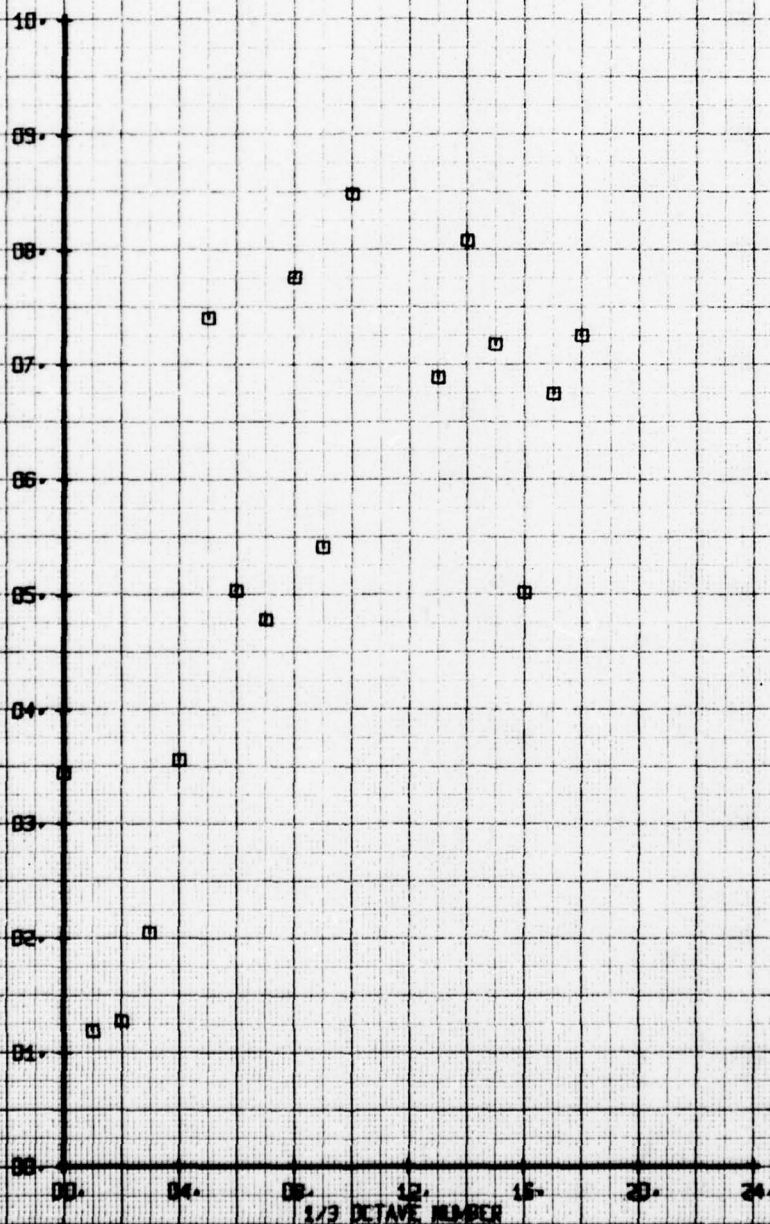
SYN CH PARAMETER  
 □ 74 VEL-1RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U BLADES OFF, NON-ROT, HUB  
 RUN 158 TP 7

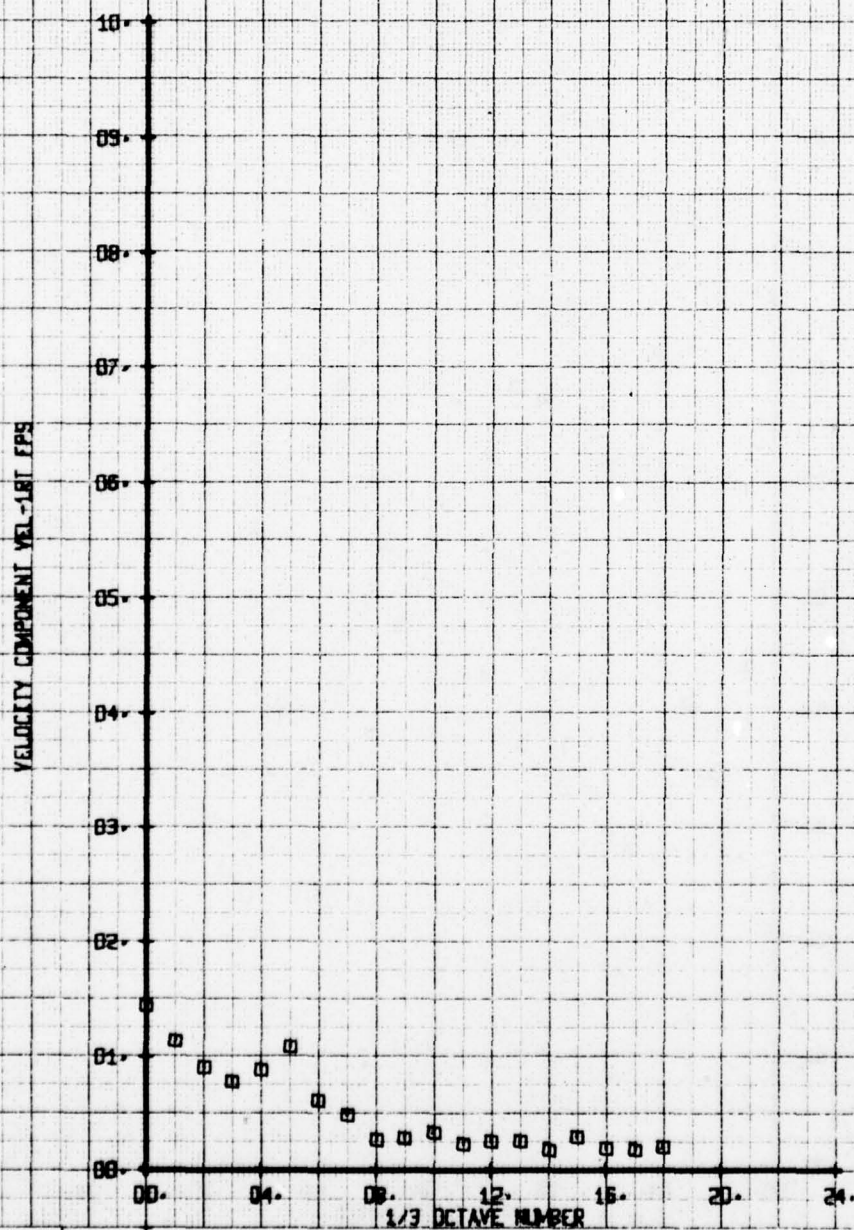
LEGEND  
 SYM CH PARAMETER  
 □ 74 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11 BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 9

LEGEND  
 SYM CH PARAMETER  
 □ 74 VEL-1RT

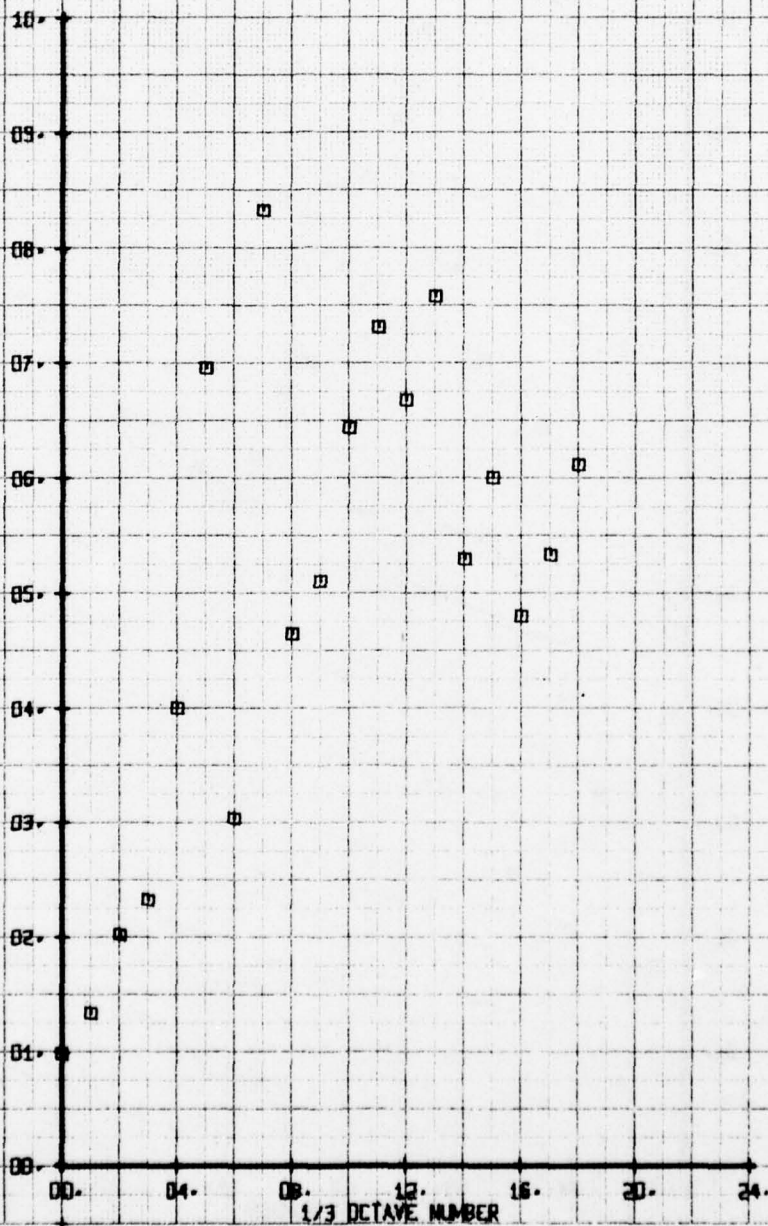




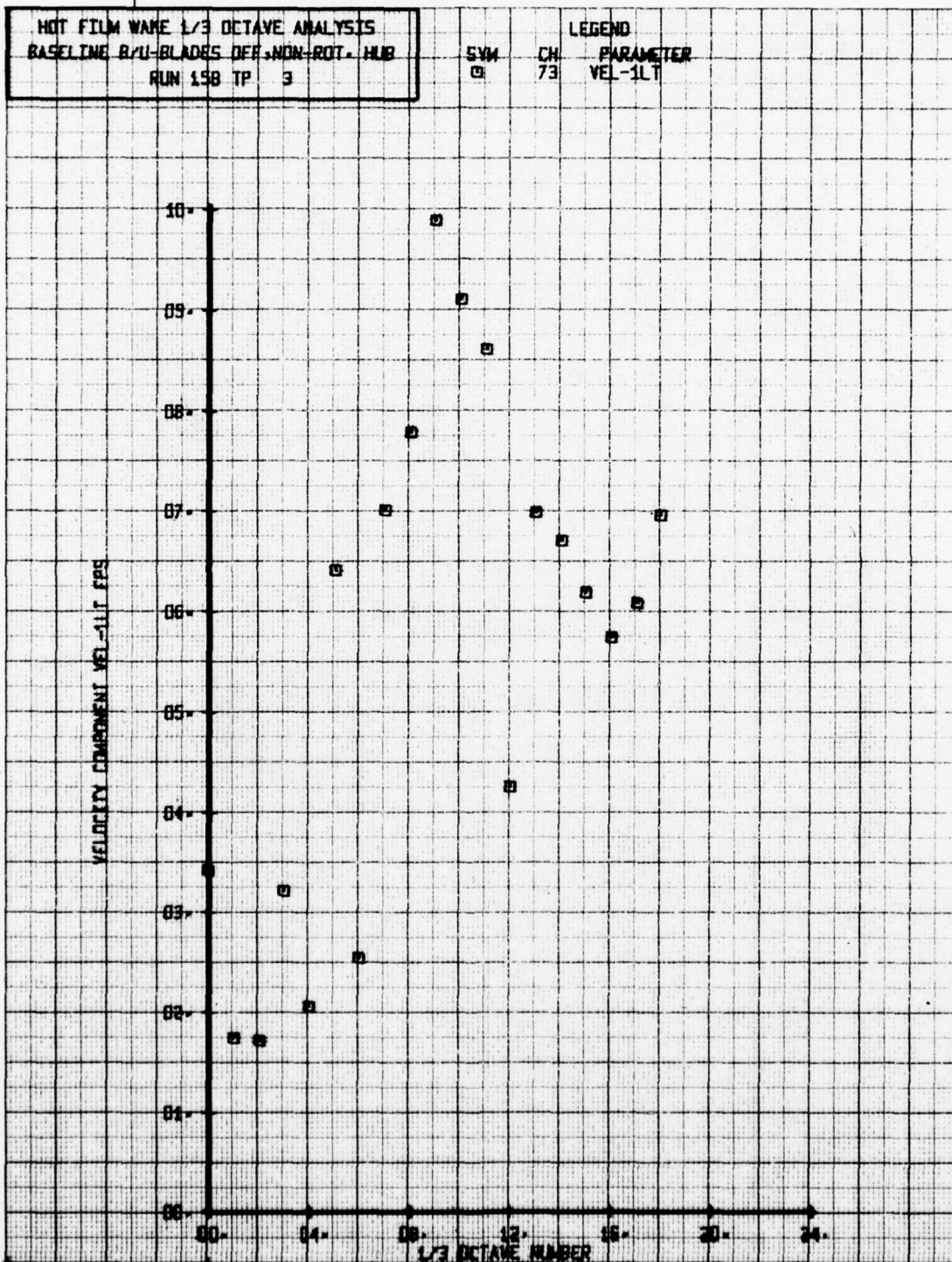
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 2

LEGEND  
 SYM CH PARAMETER  
 □ 73 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS







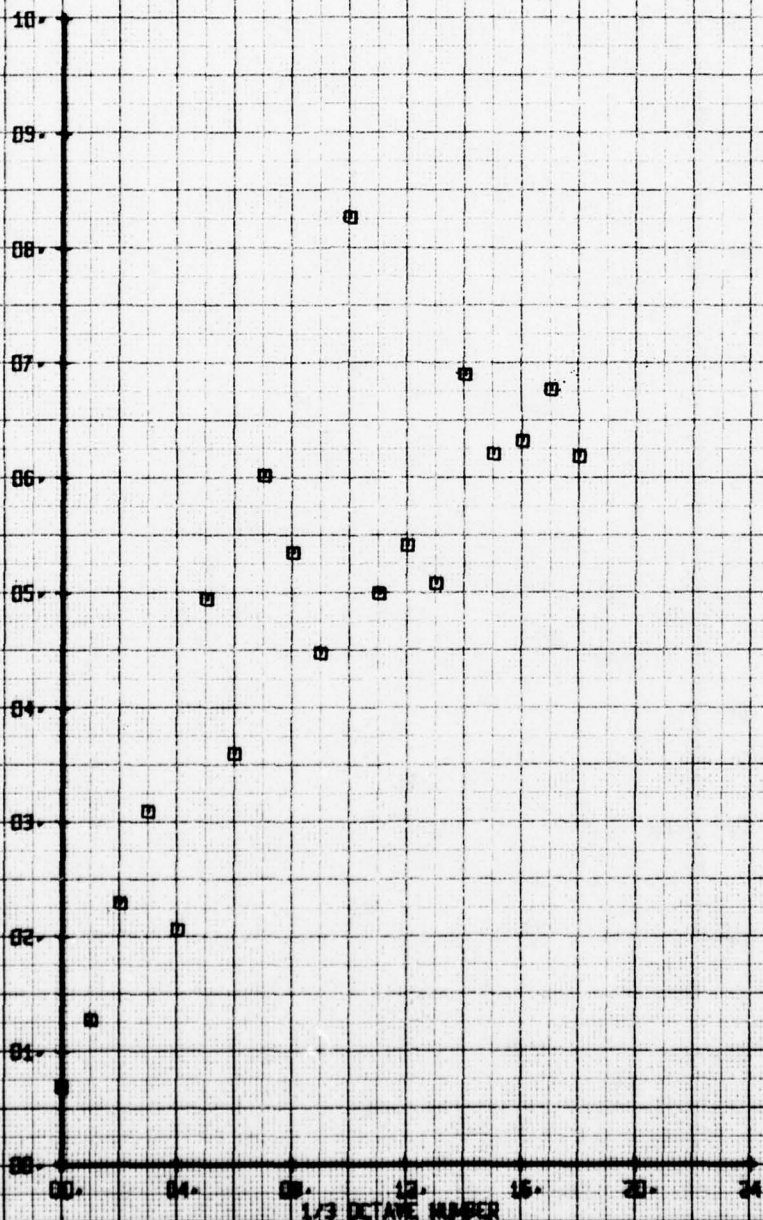
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 4

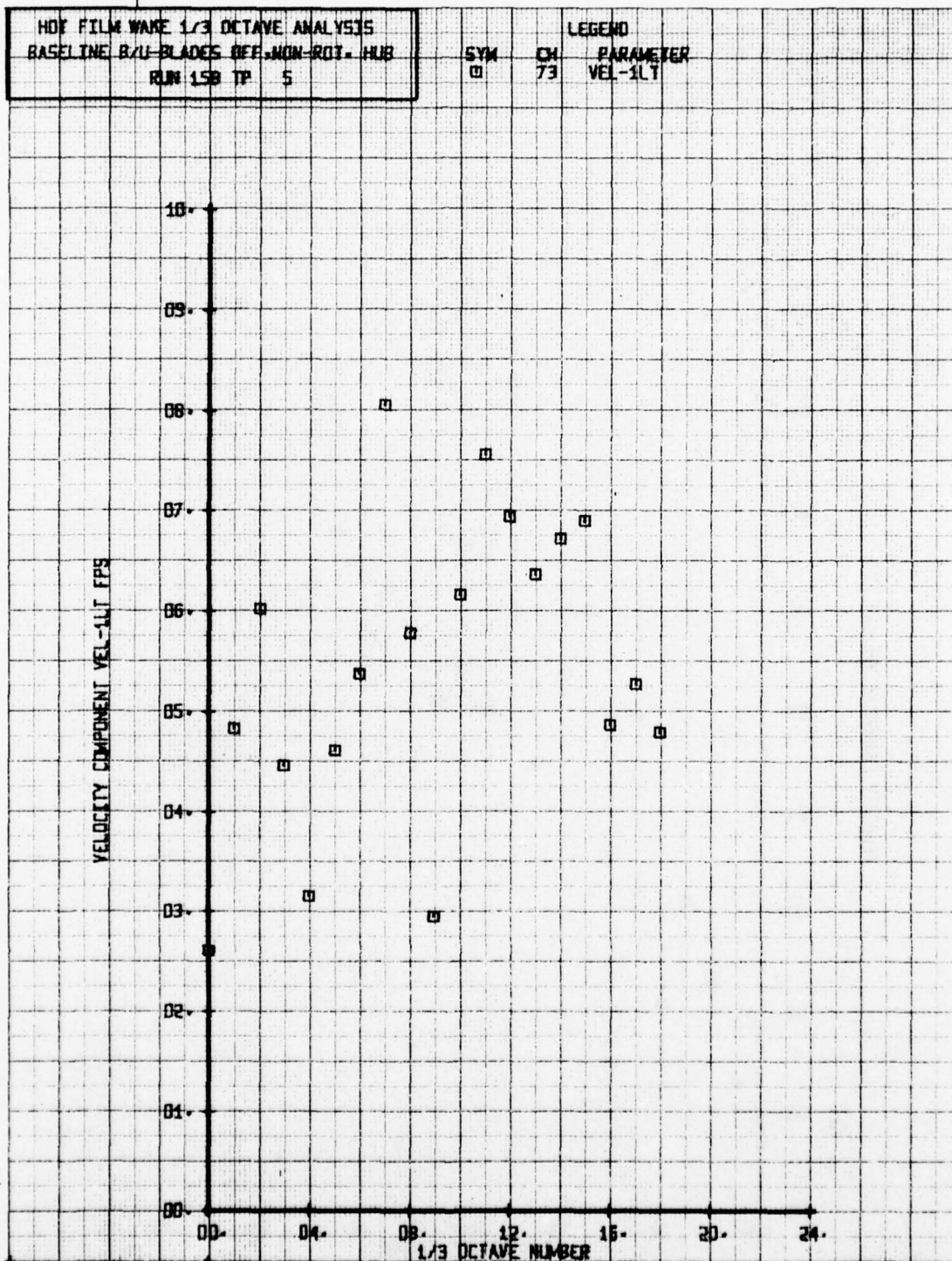
SYM  
 □

CH  
 73

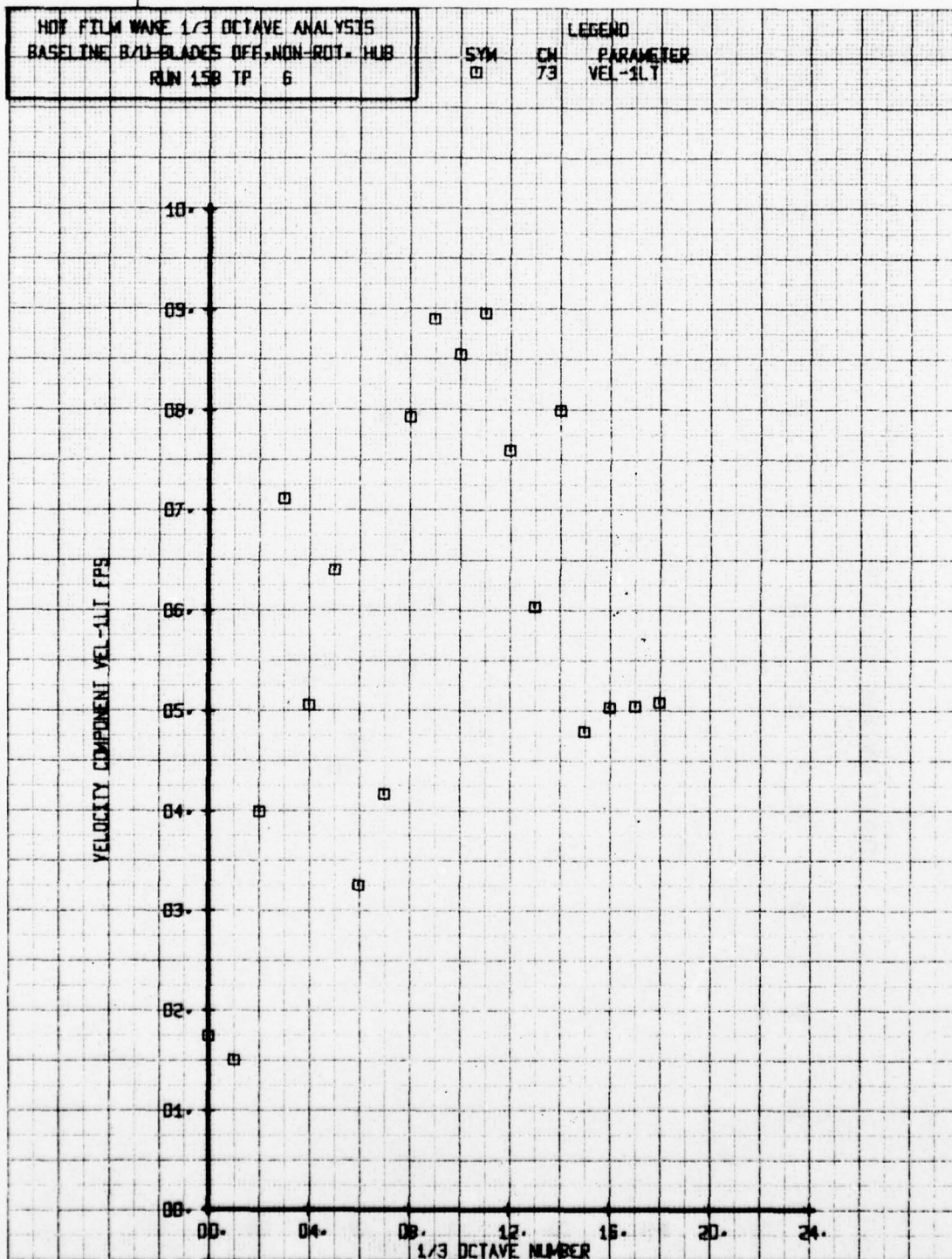
LEGEND  
 PARAMETER  
 VEL-1LT

VELOCITY COMPONENT VEL-1LT FPS

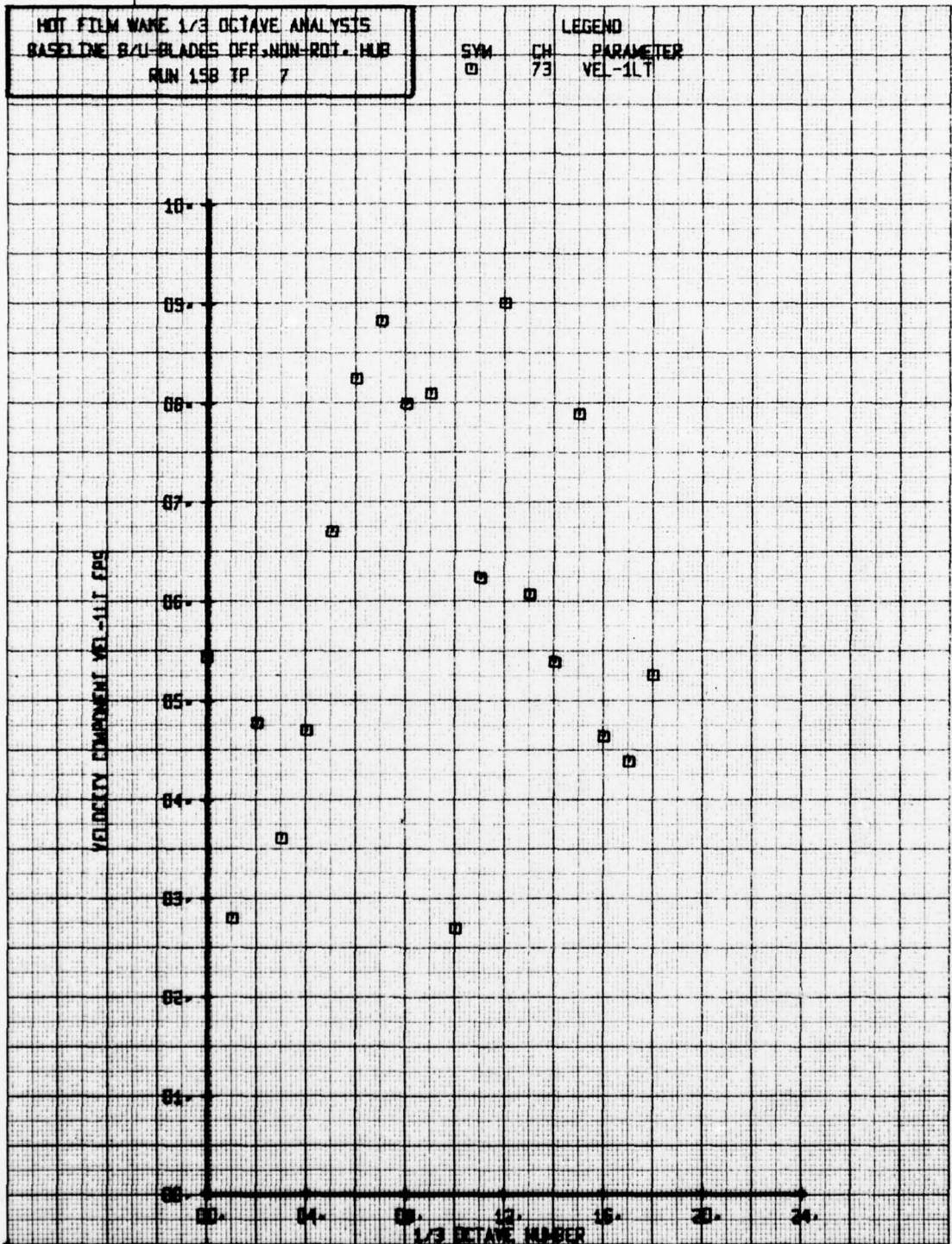


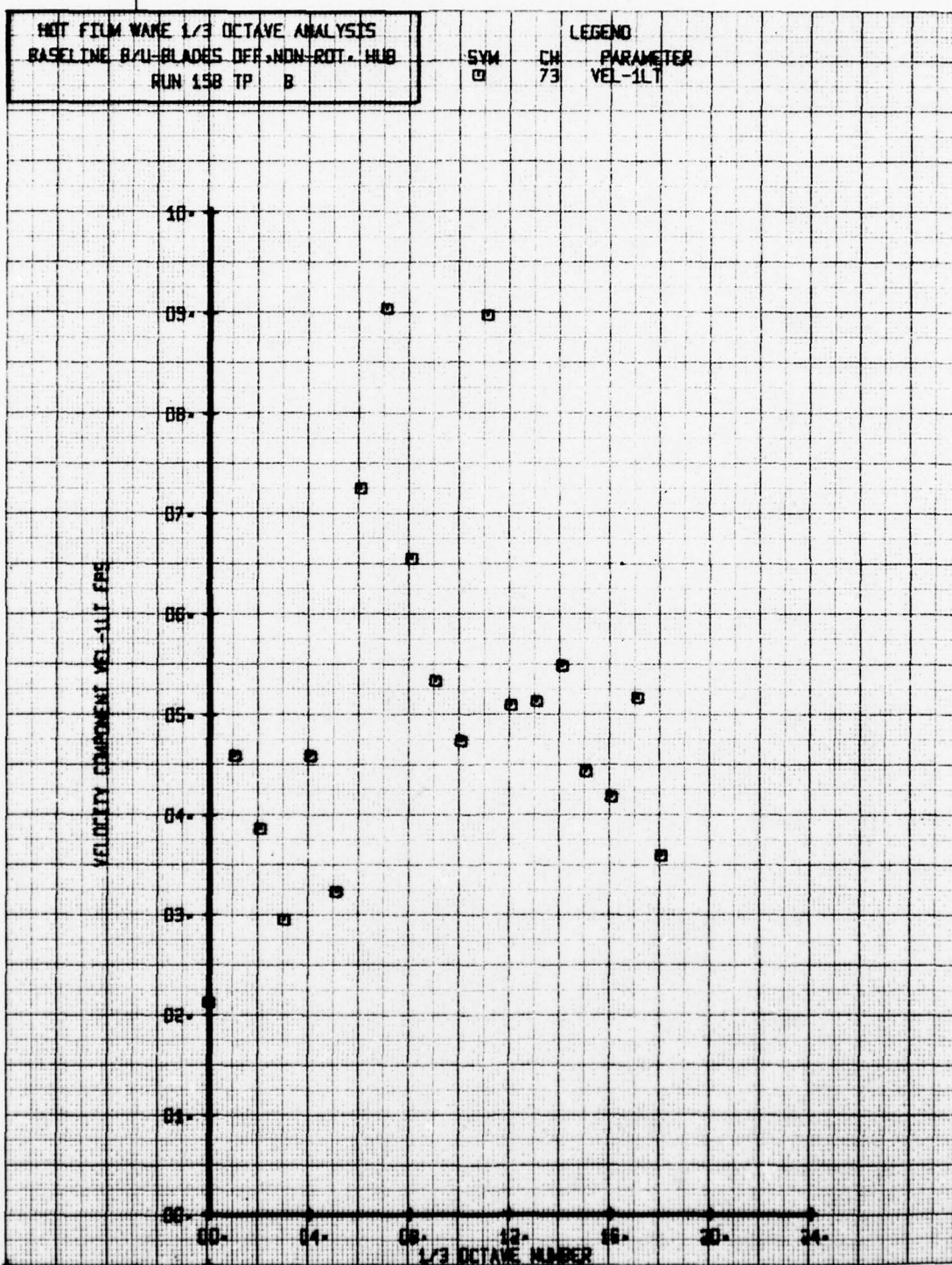












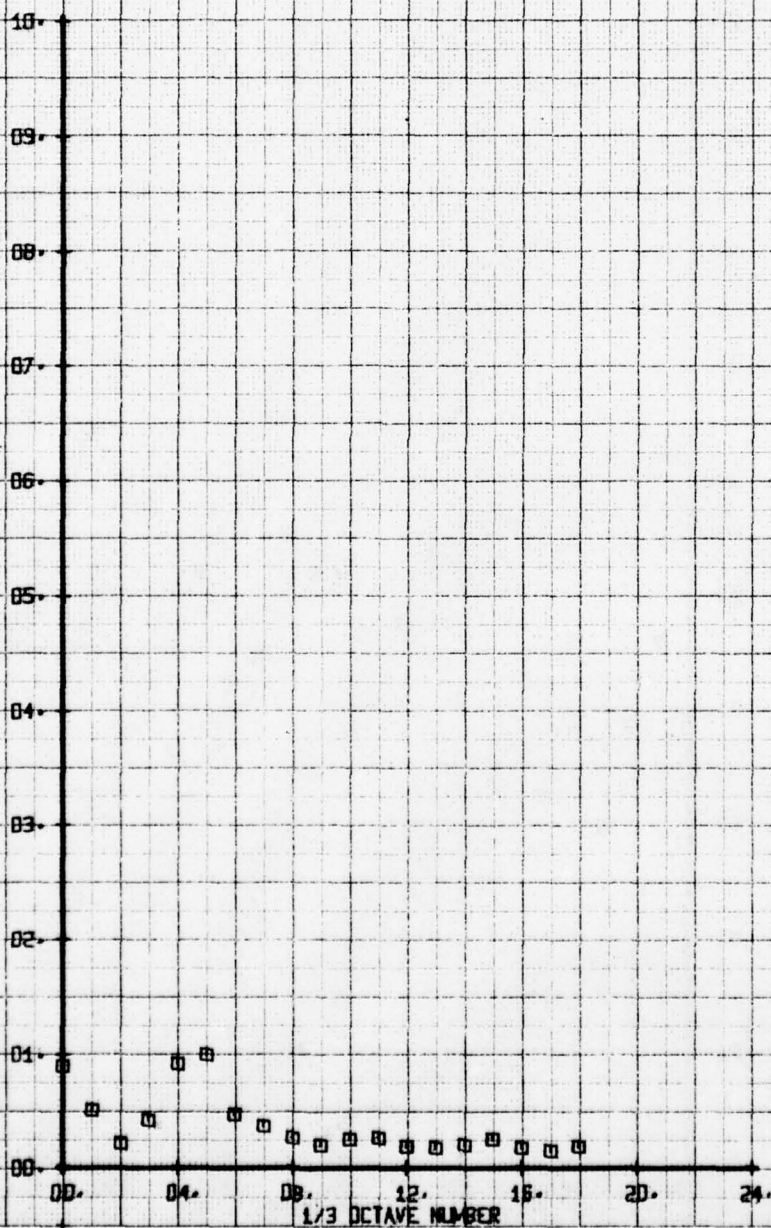
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 9

SYM  
 □

CH  
 73

LEGEND  
 PARAMETER  
 VEL-1LY

VELOCITY COMPONENT VEL-1LY FFS



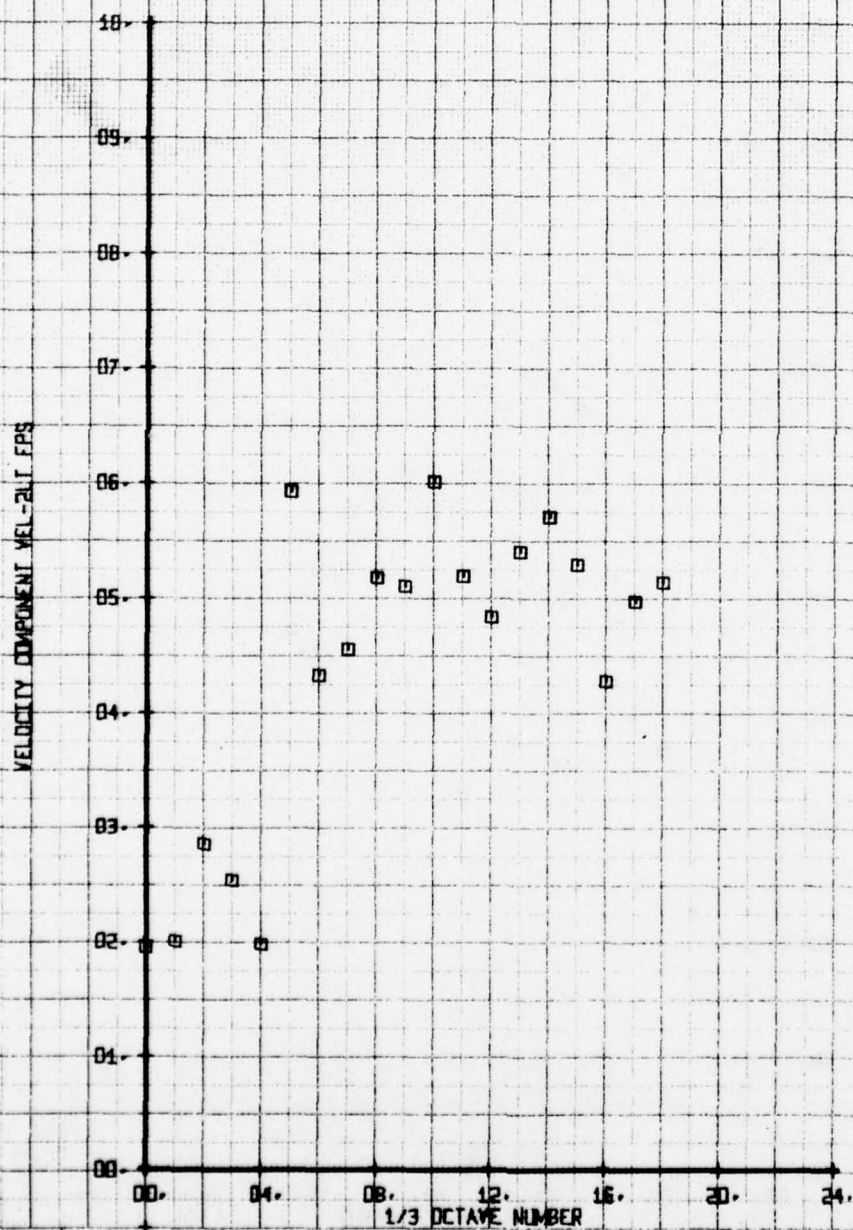


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B-11-BLADES OFF, NON-ROT. MUR  
 RUN 158 IP 2

SYM  
 0

CH  
 72

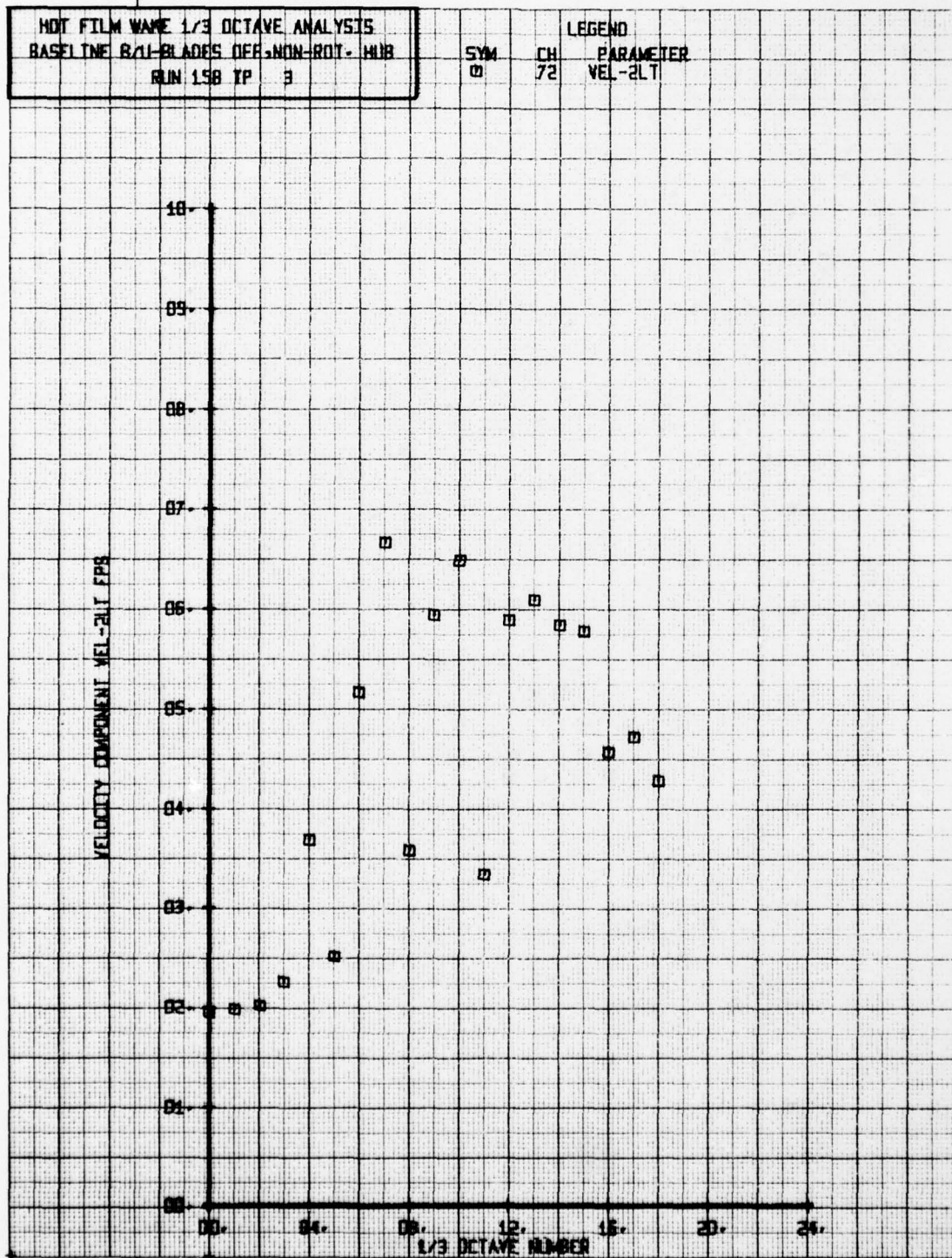
LEGEND  
 PARAMETER  
 VEL-2LT

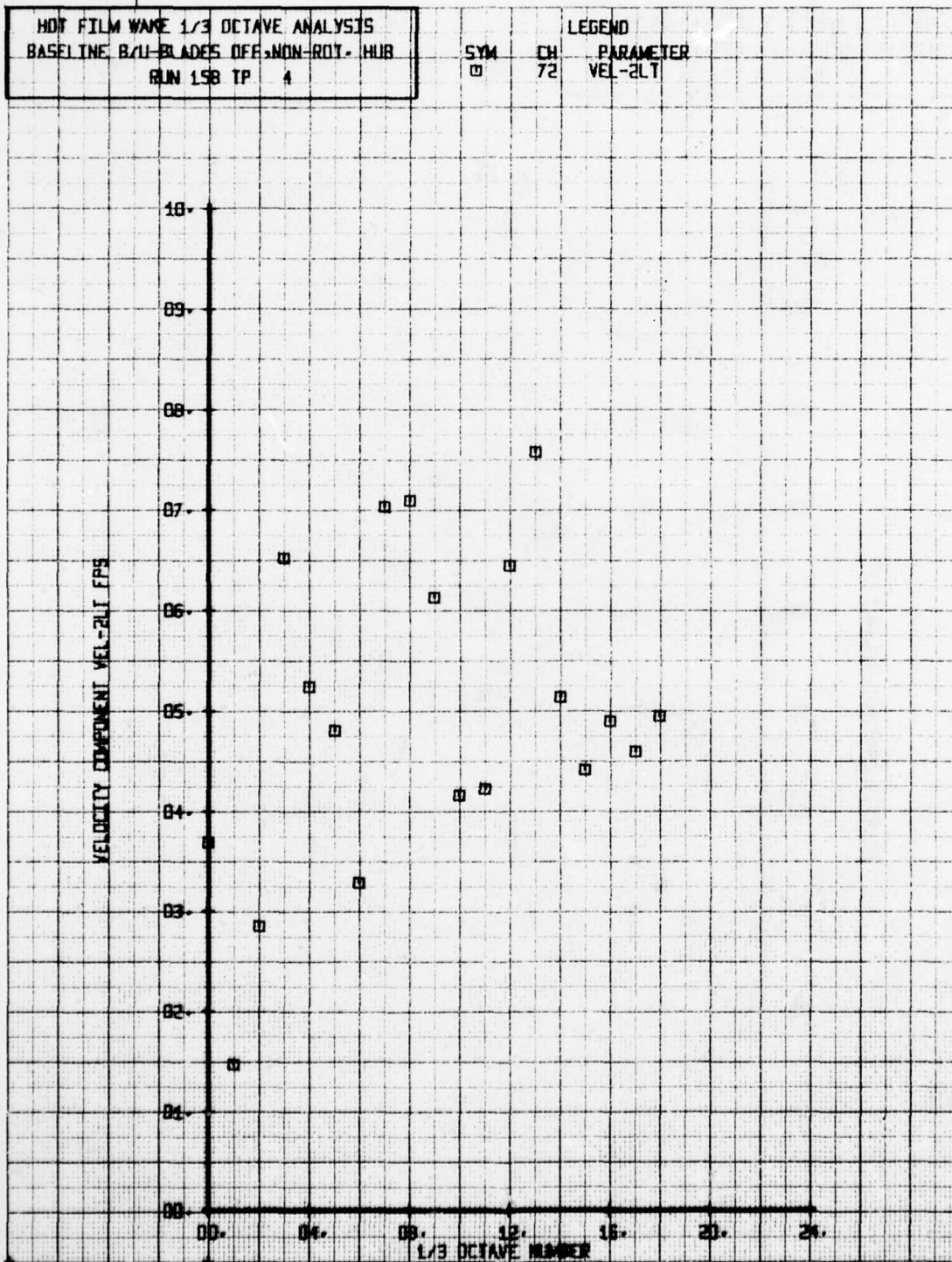


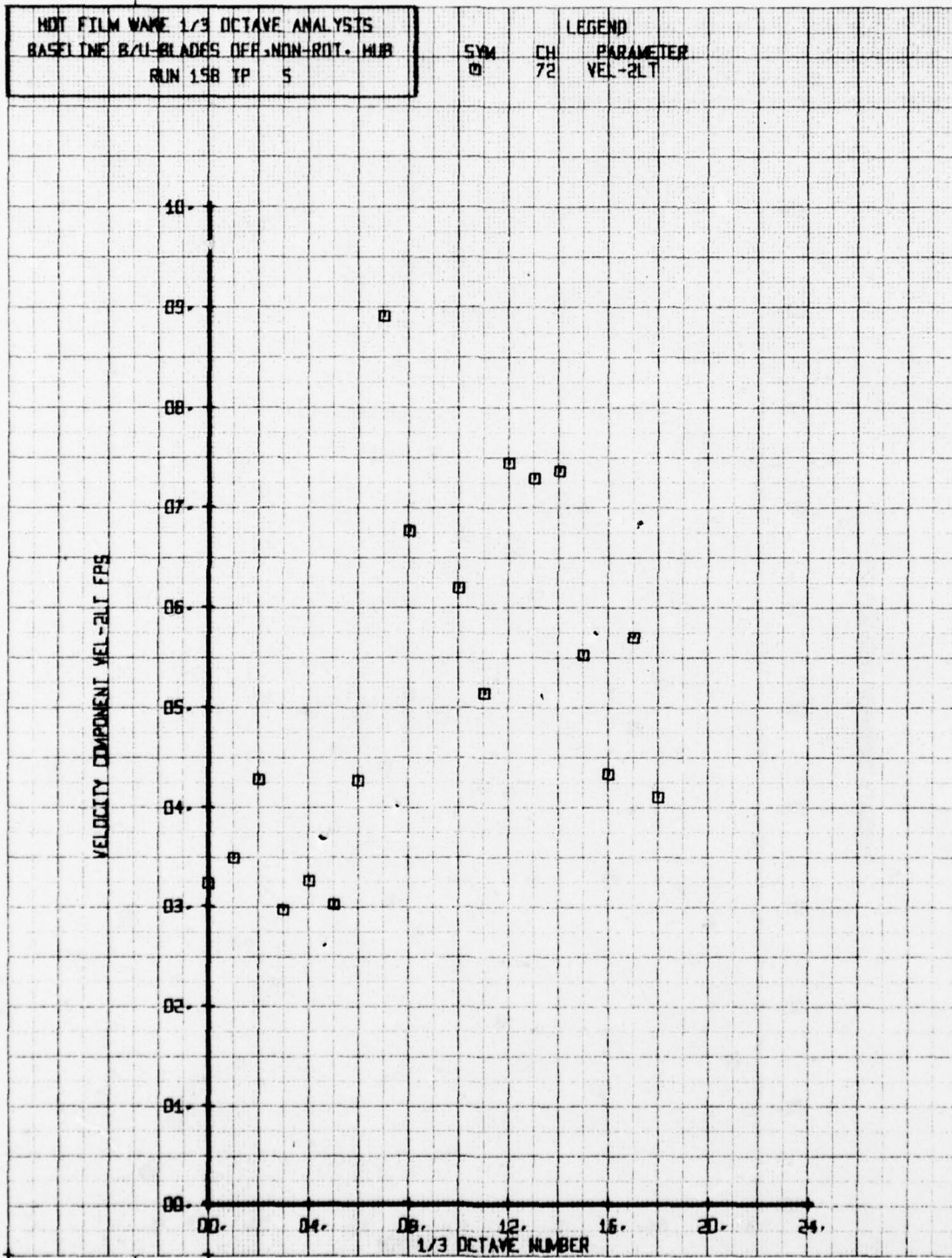


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-BLADES DEF. NON-ROT. HUB  
 RUN 158 TP 3

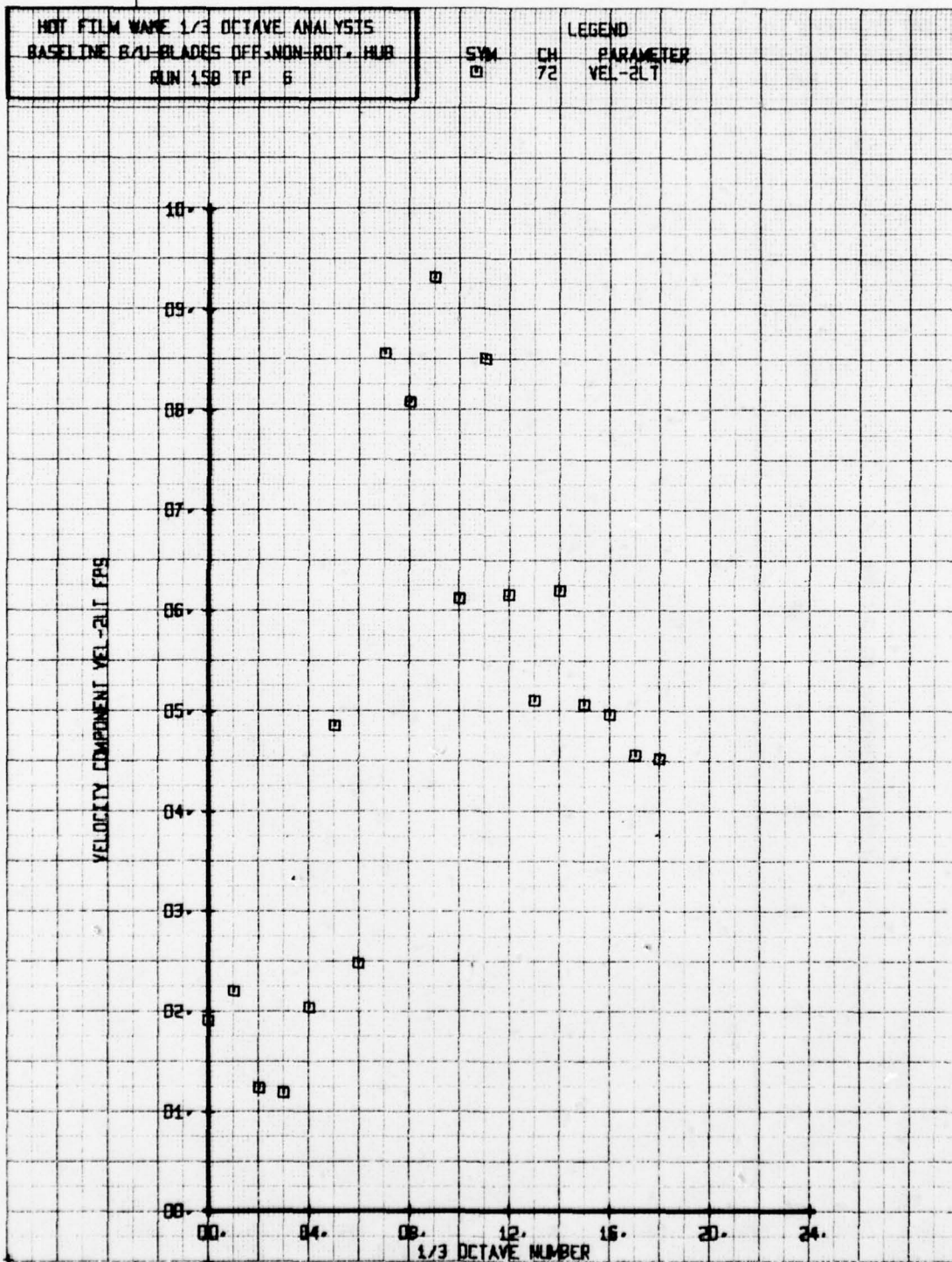
SYM	CH	PARAMETER
0	72	VEL-2LT



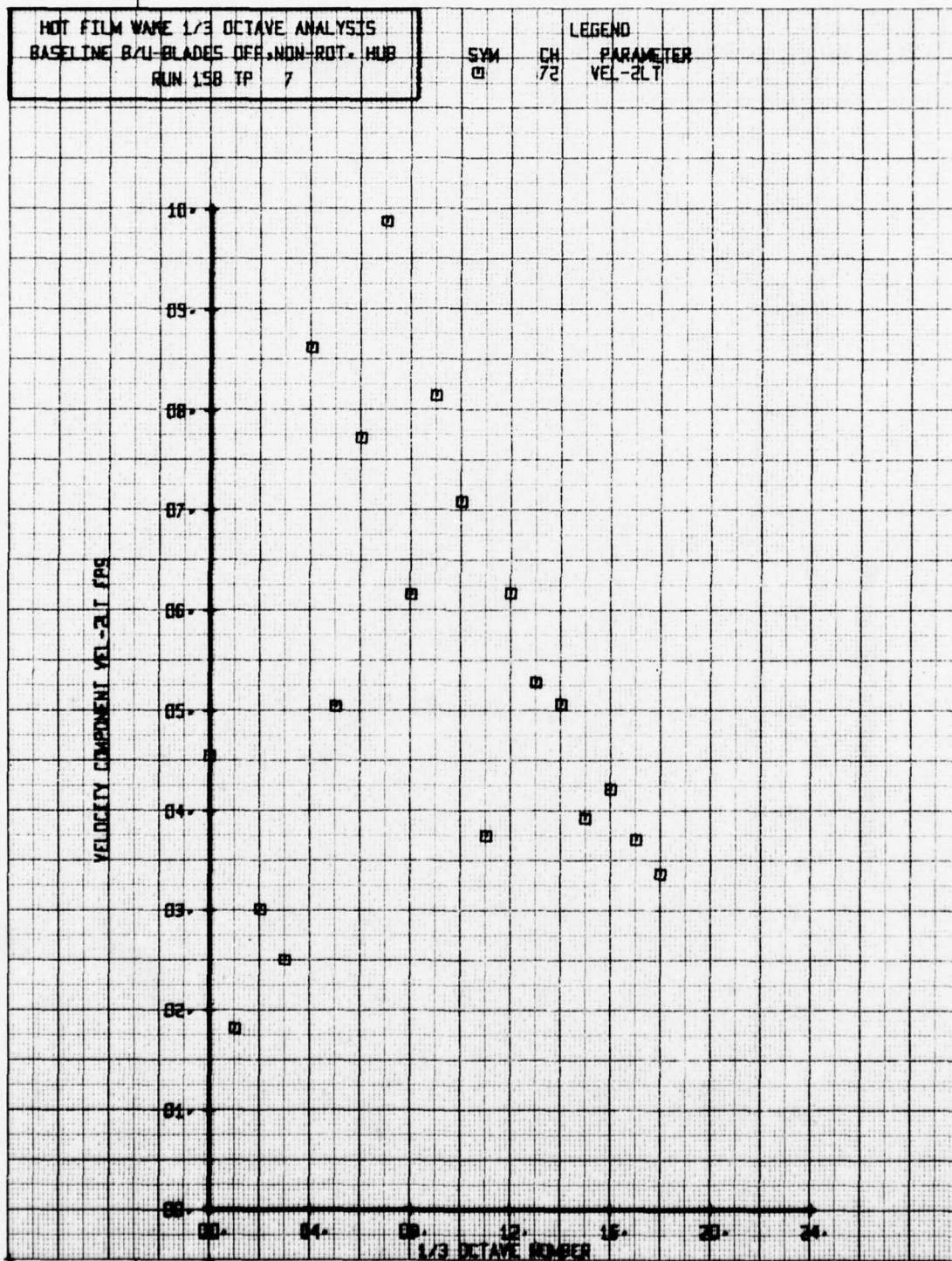






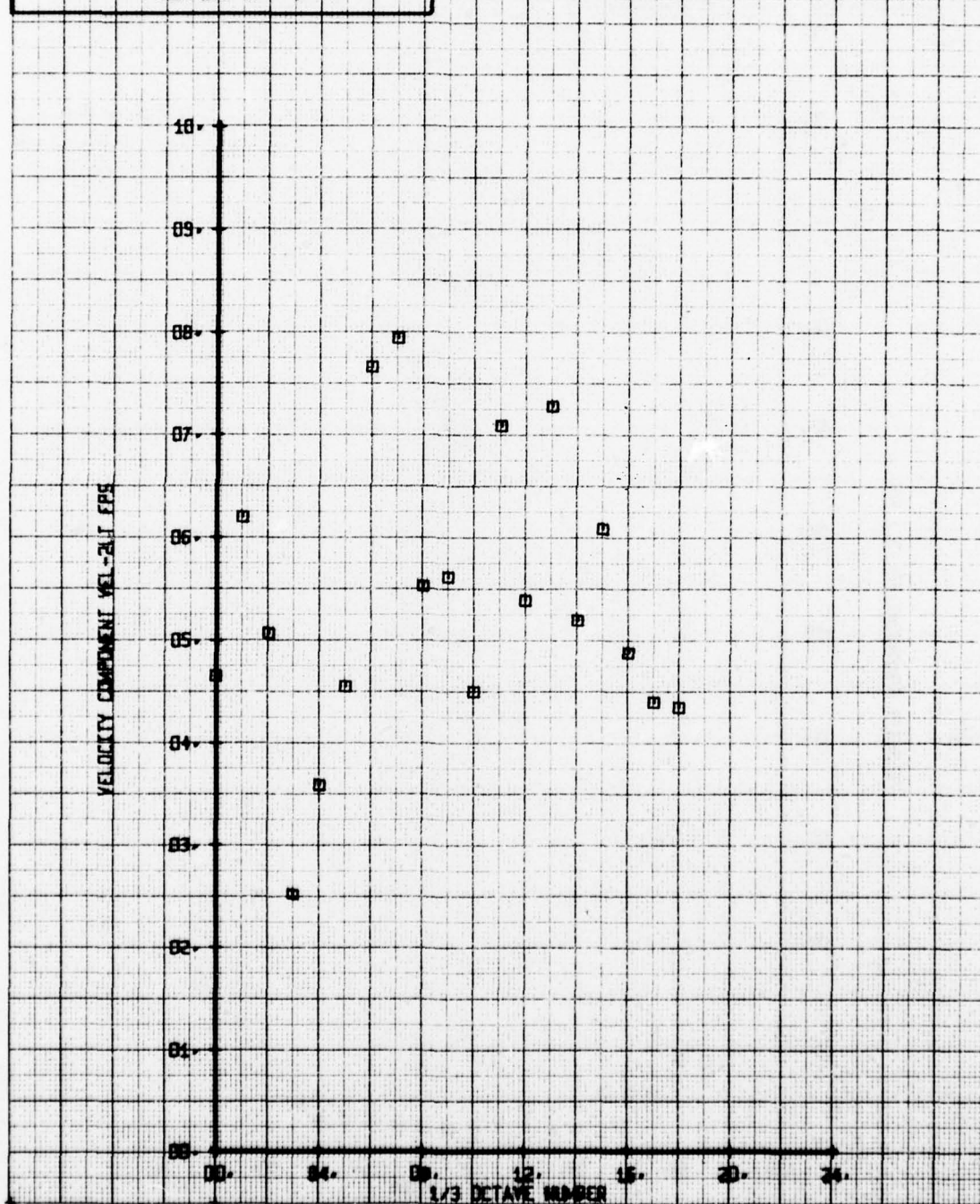






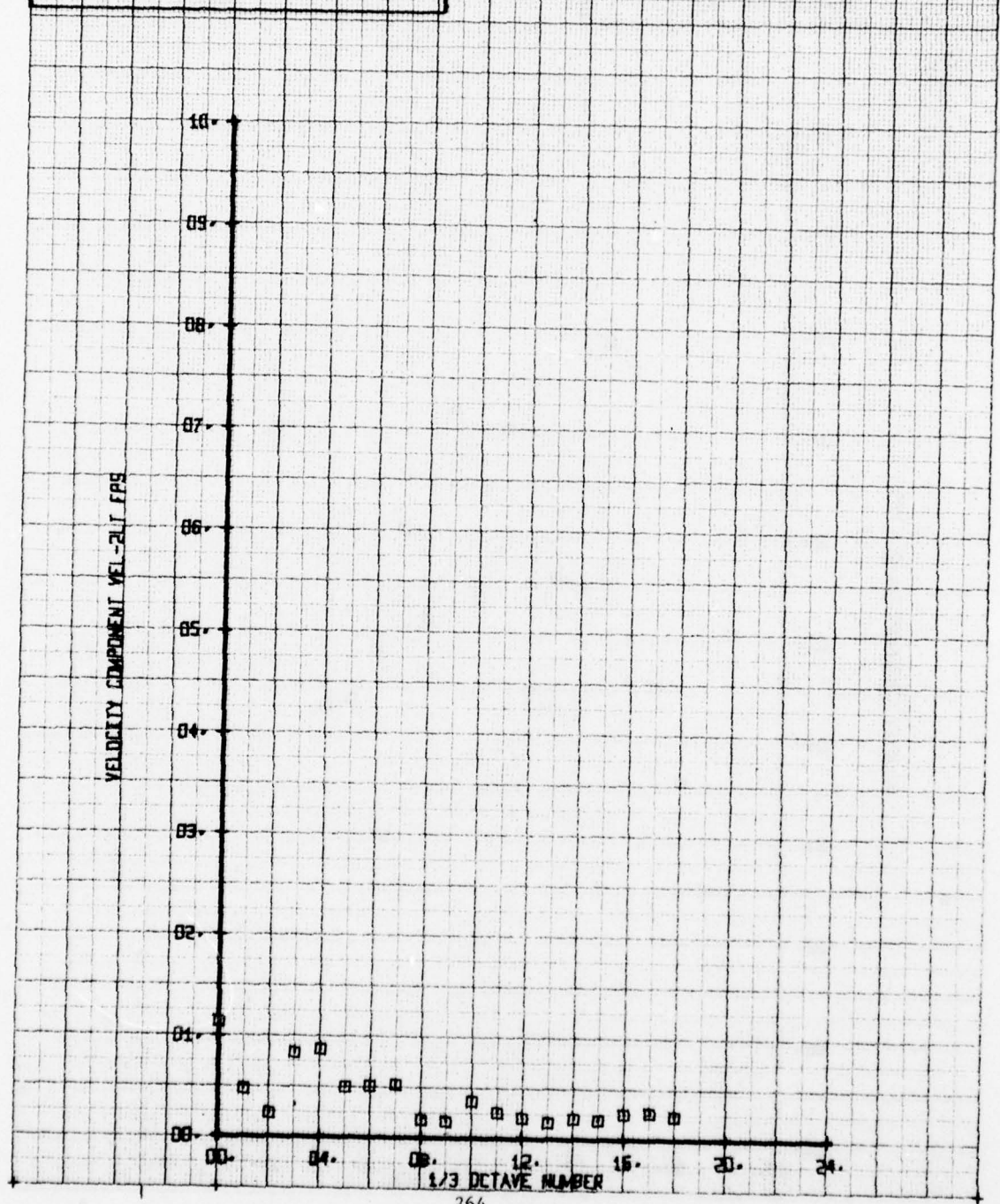
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/U-BLADES OFF, NON-ROT. HUB  
 RUN 158 TP B

SYM CH PARAMETER  
 □ 72 VEL-2LT

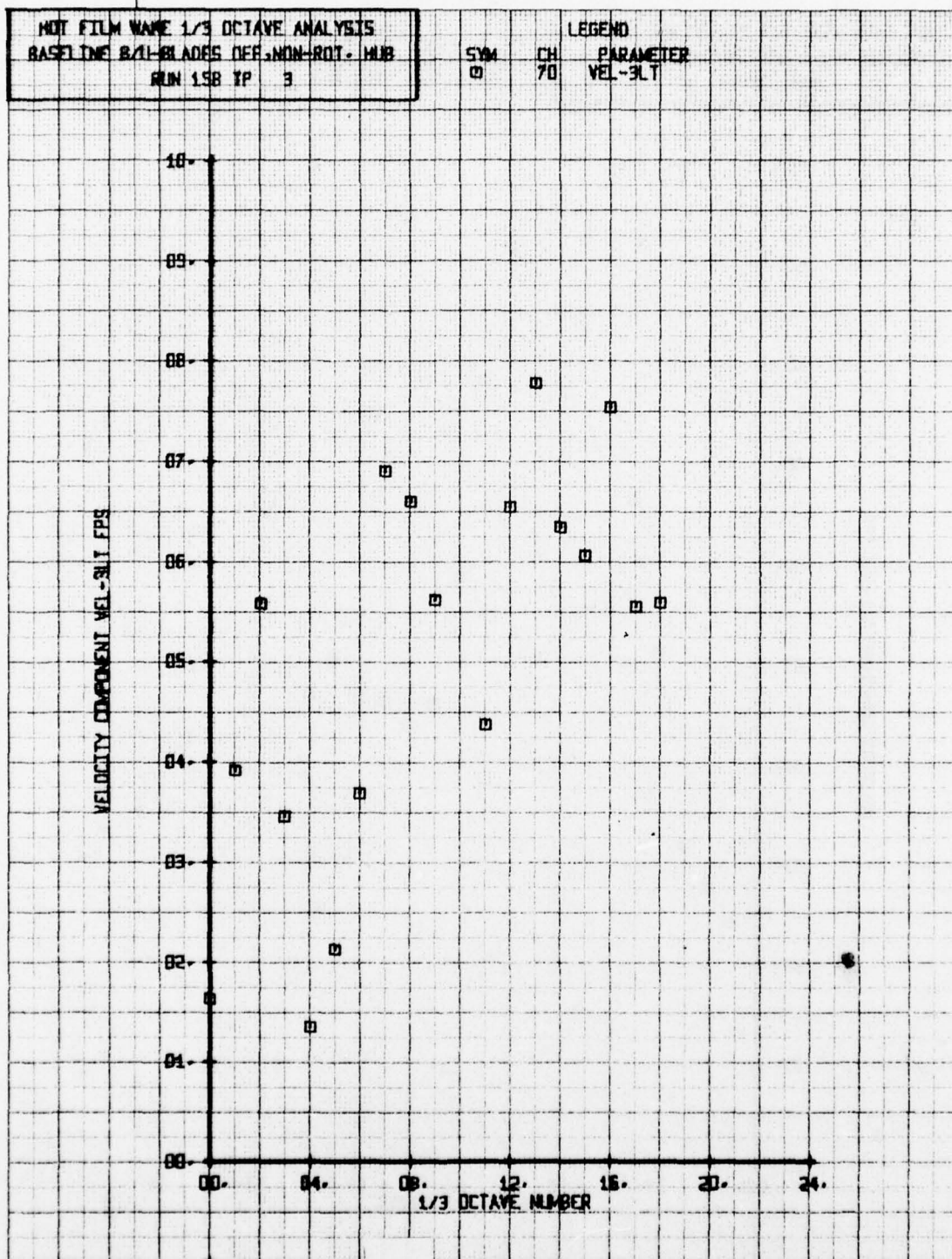


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B-11 BLADES OFF, NON-ROT. HUB  
 RUN 158 TP 9

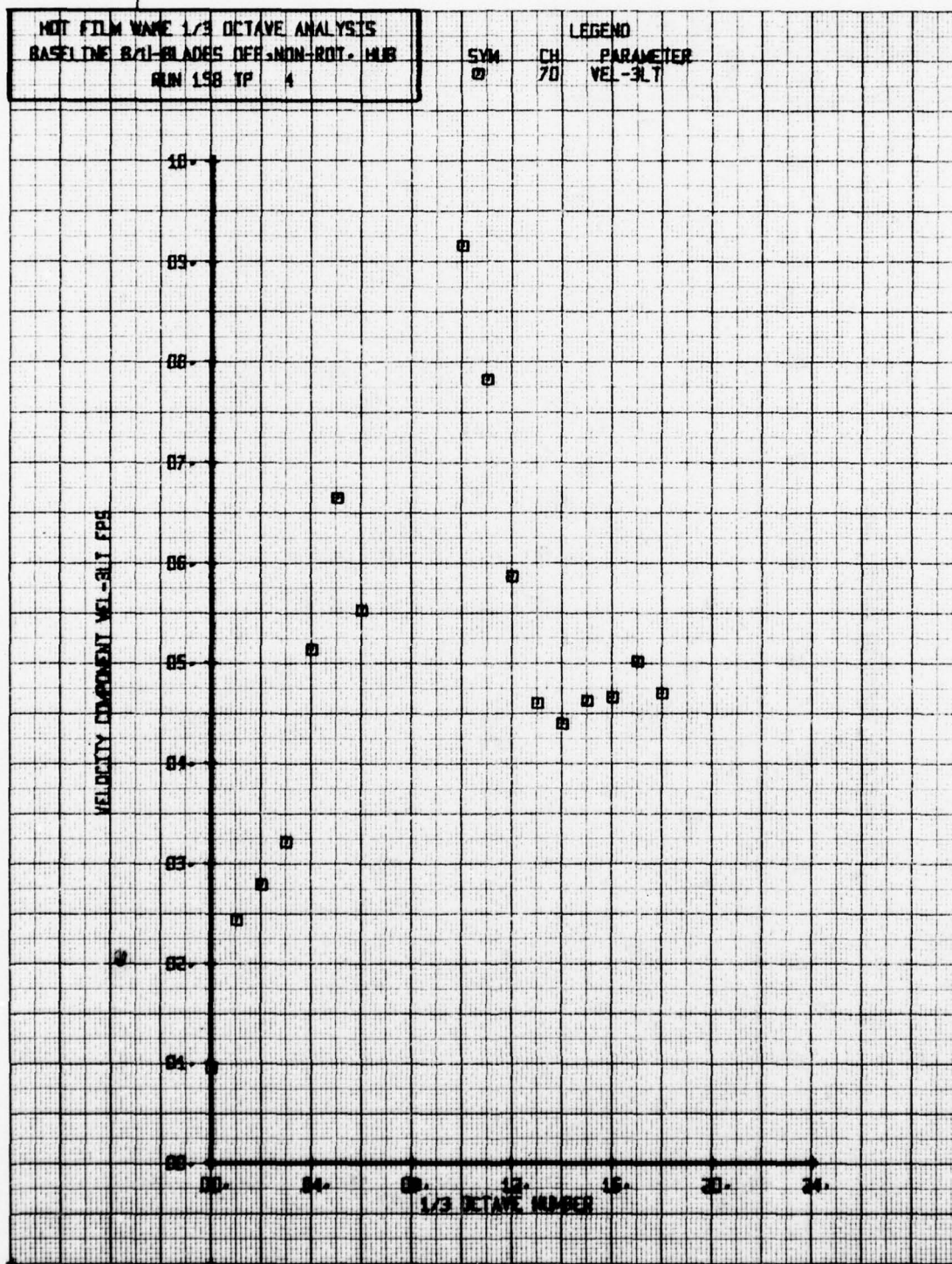
LEGEND	
SYM	CH
□	72
	PARAMETER
	VEL-2LT

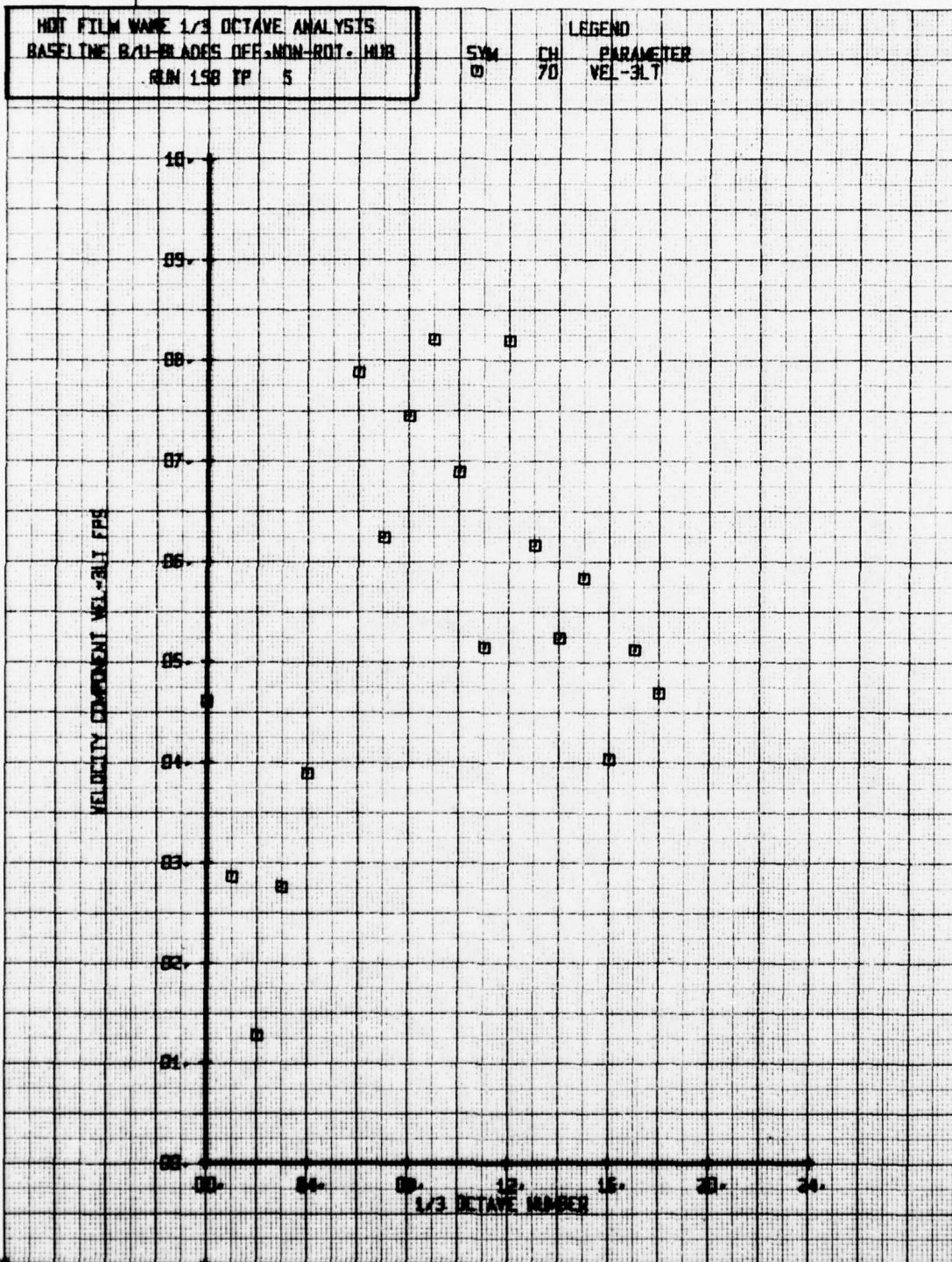


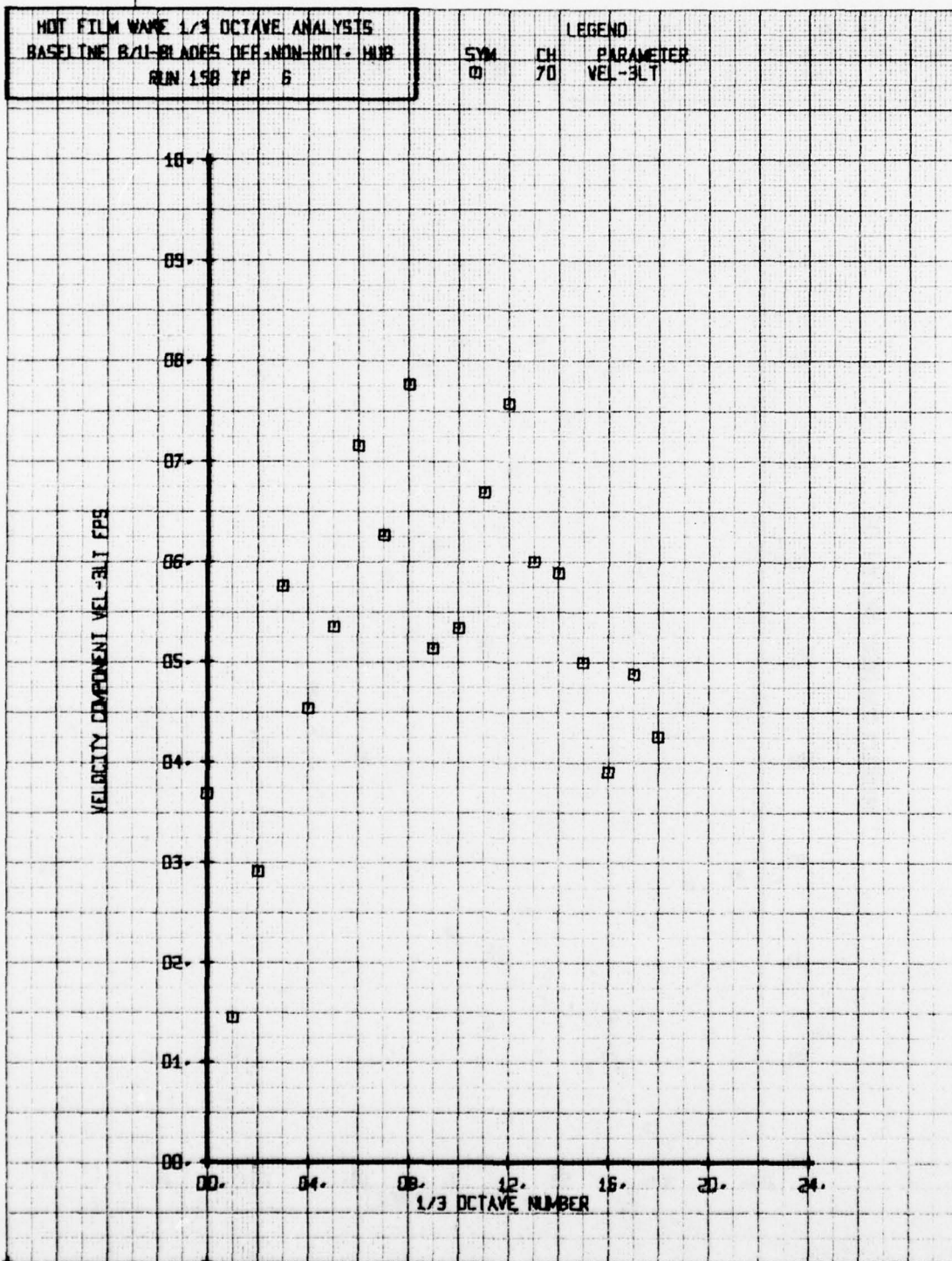








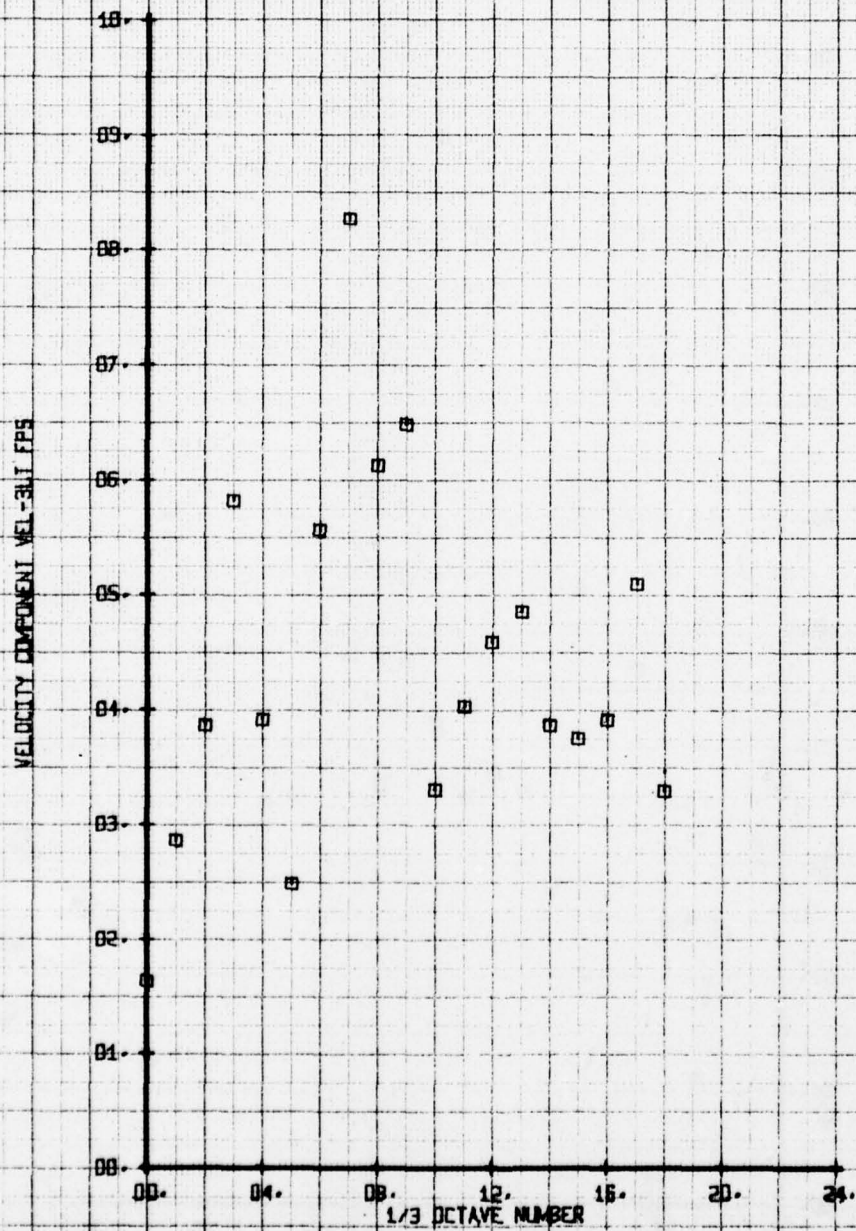




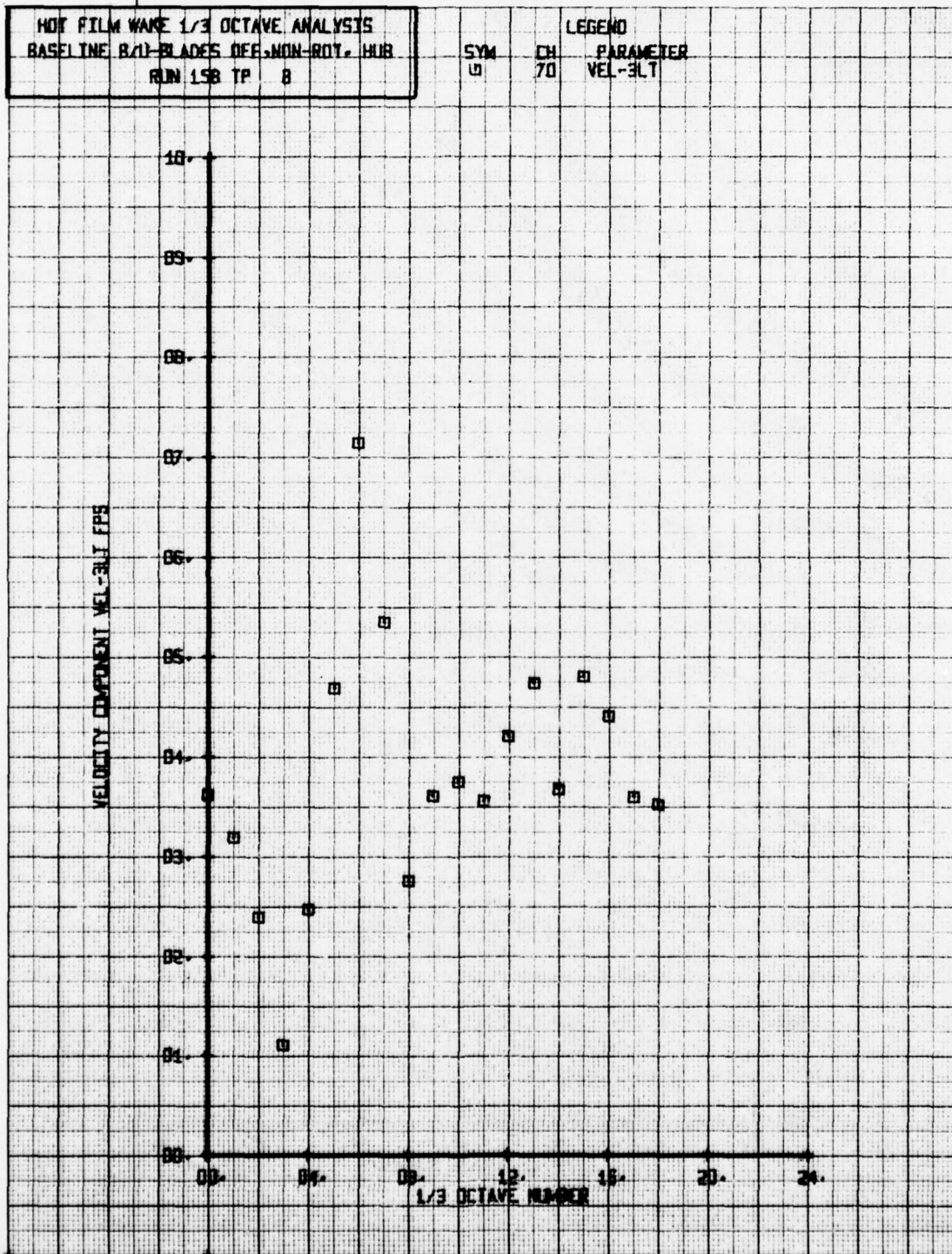


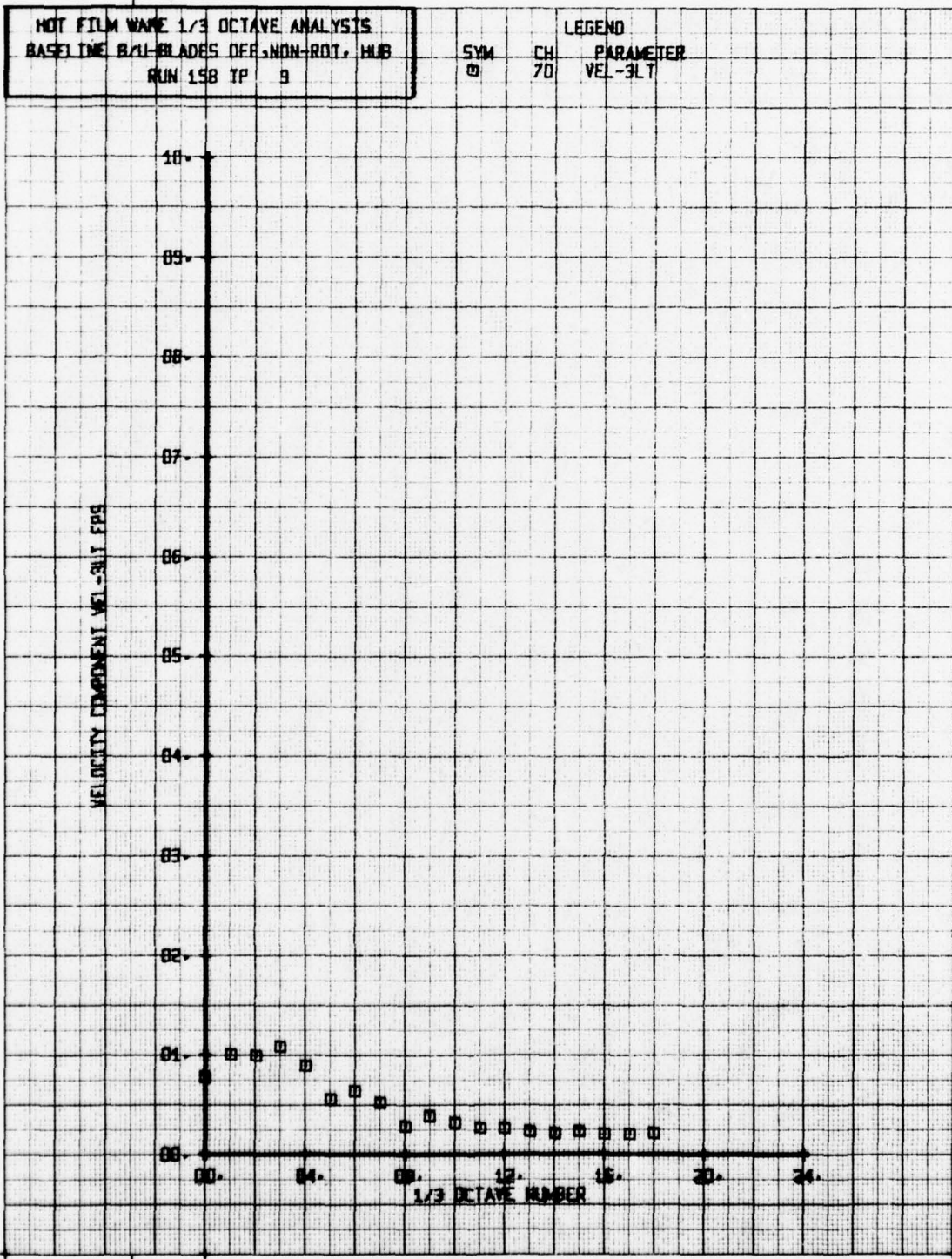
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/11-BLADES OFF-NON-ROT. HUB  
 RUN 158 TP 7

SYM	CH	PARAMETER
□	70	VEL-3LT





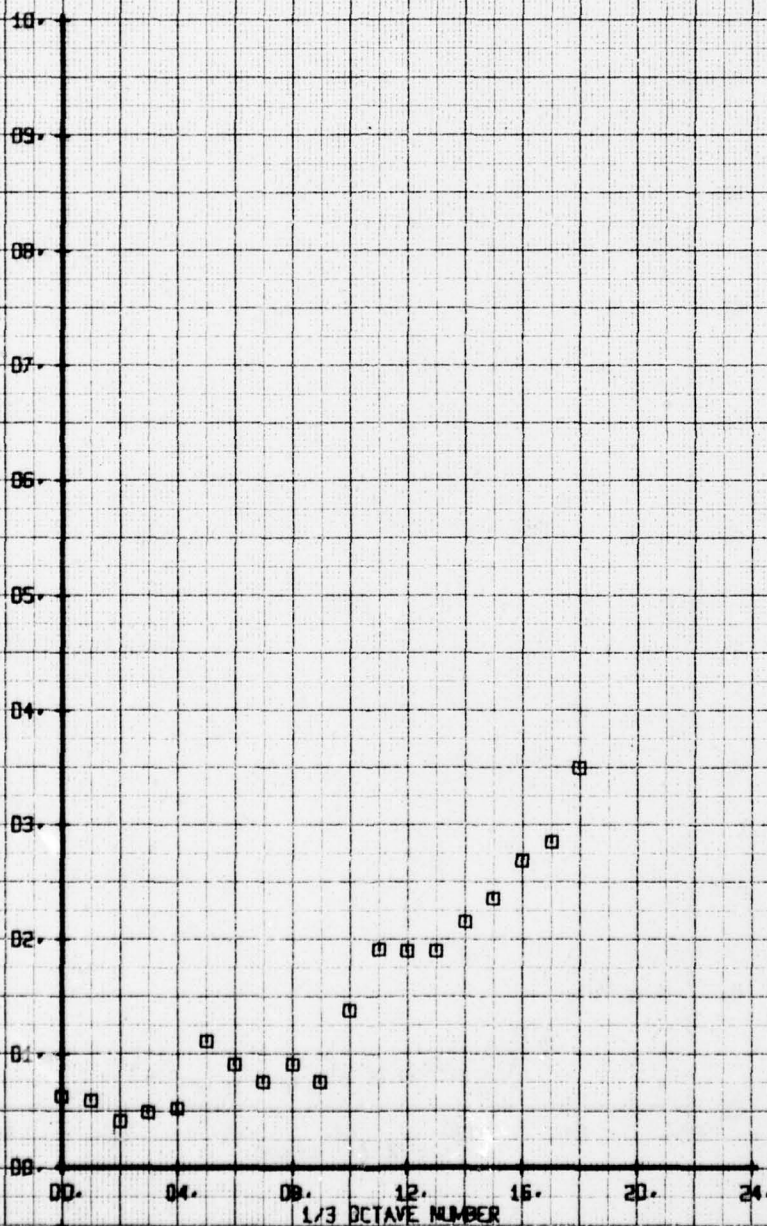




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 841-BLADES OFF, HUB OFF  
 RUN 159 TP 1

LEGEND		
SYM	CH	PARAMETER
□	71	VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS

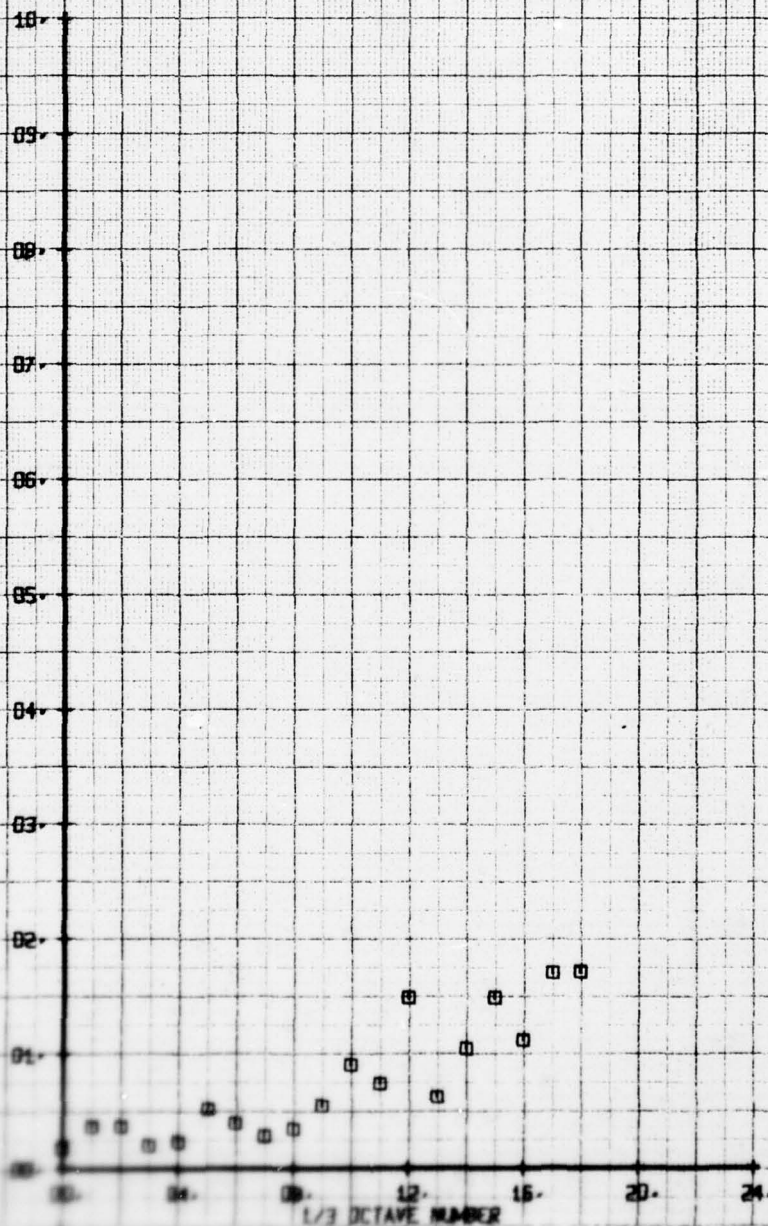




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/L-BLADES OFF, HUB OFF  
 RUN 159 TP 2

SYM	CH	PARAMETER
□	71	VEL-3RT

VELOCITY COMPONENT VEL-3RT FPS

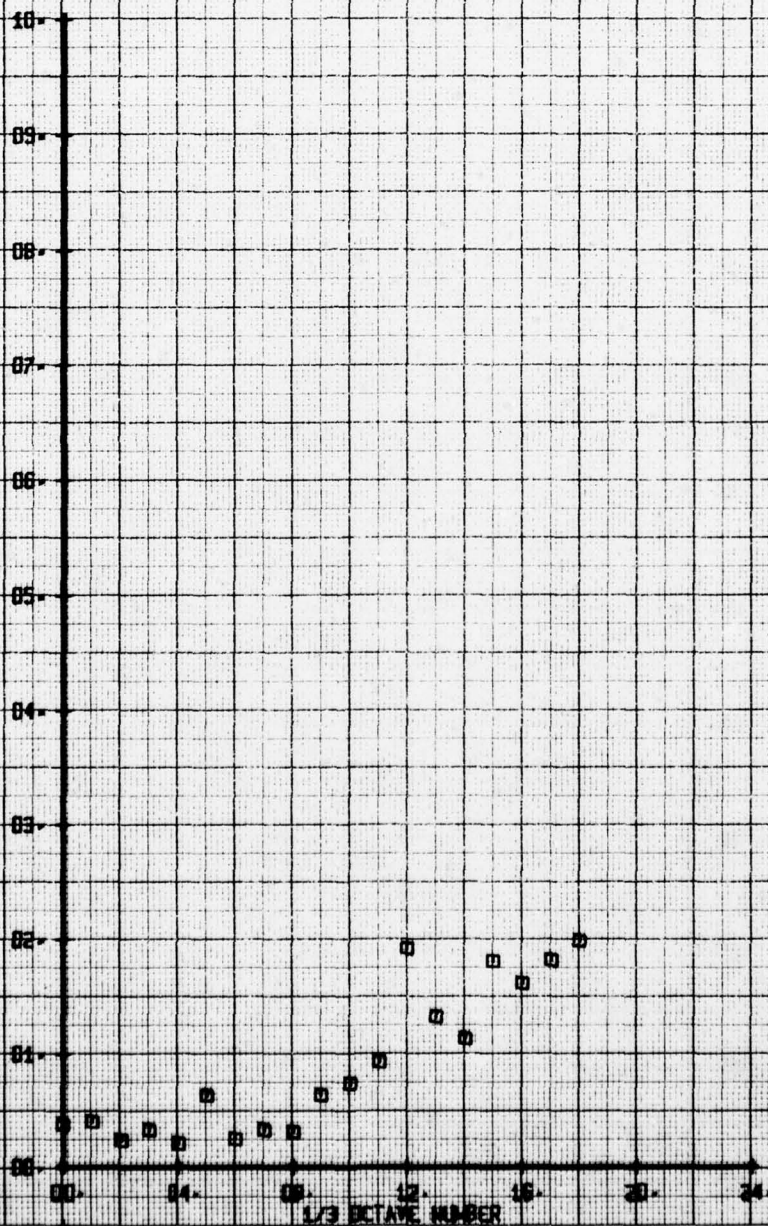




HOT FILM WARE 1/3 OCTAVE ANALYSIS  
 BASELINE BAL-BLADES OFF, HUB OFF  
 RUN 159 TP 3

LEGEND		
SYM	CH	PARAMETER
□	71	VEL-3RT

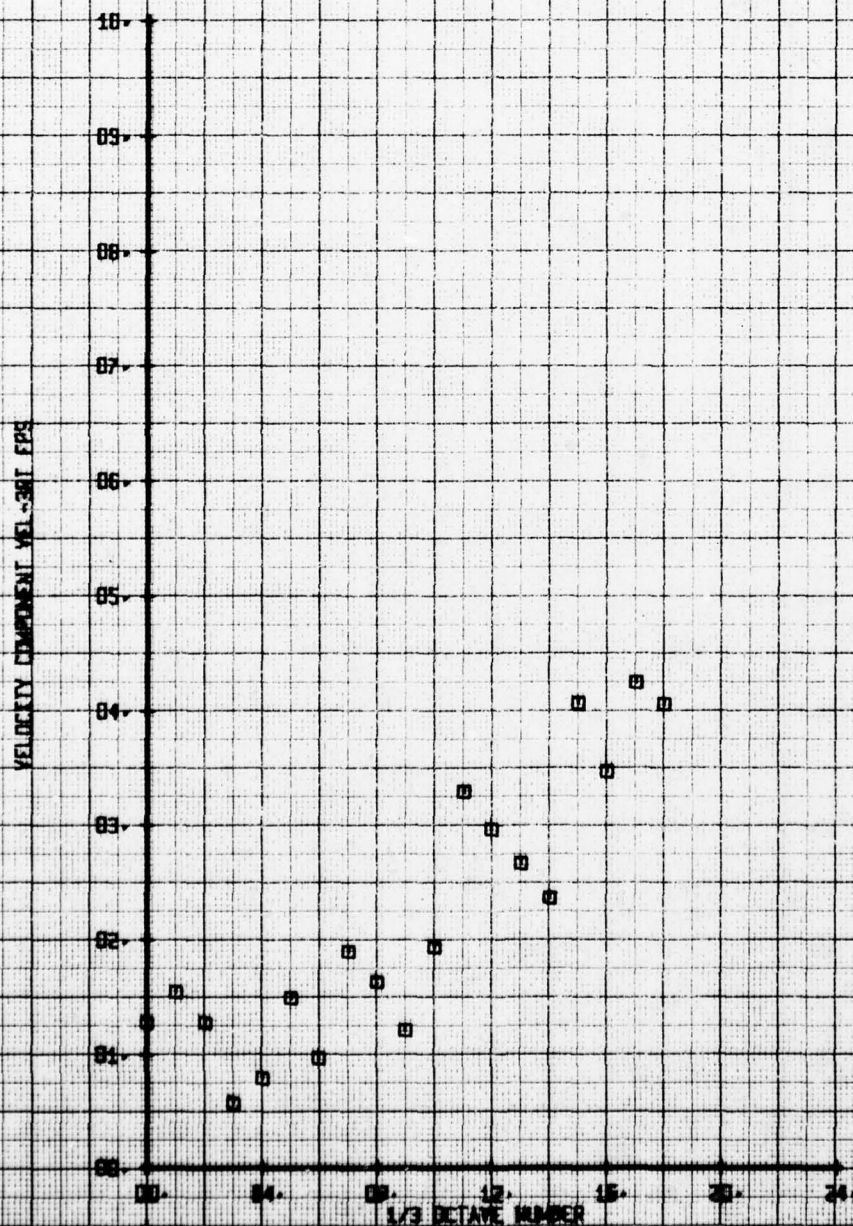
VELOCITY COMPONENT V<sub>3</sub>-3RT FPS



1/3 OCTAVE NUMBER

10T FILM WAVE 1/3 OCTAVE ANALYSIS  
 BASELINE B/AI-BLADES OFF, HUB OFF  
 RUN 159 TP 4

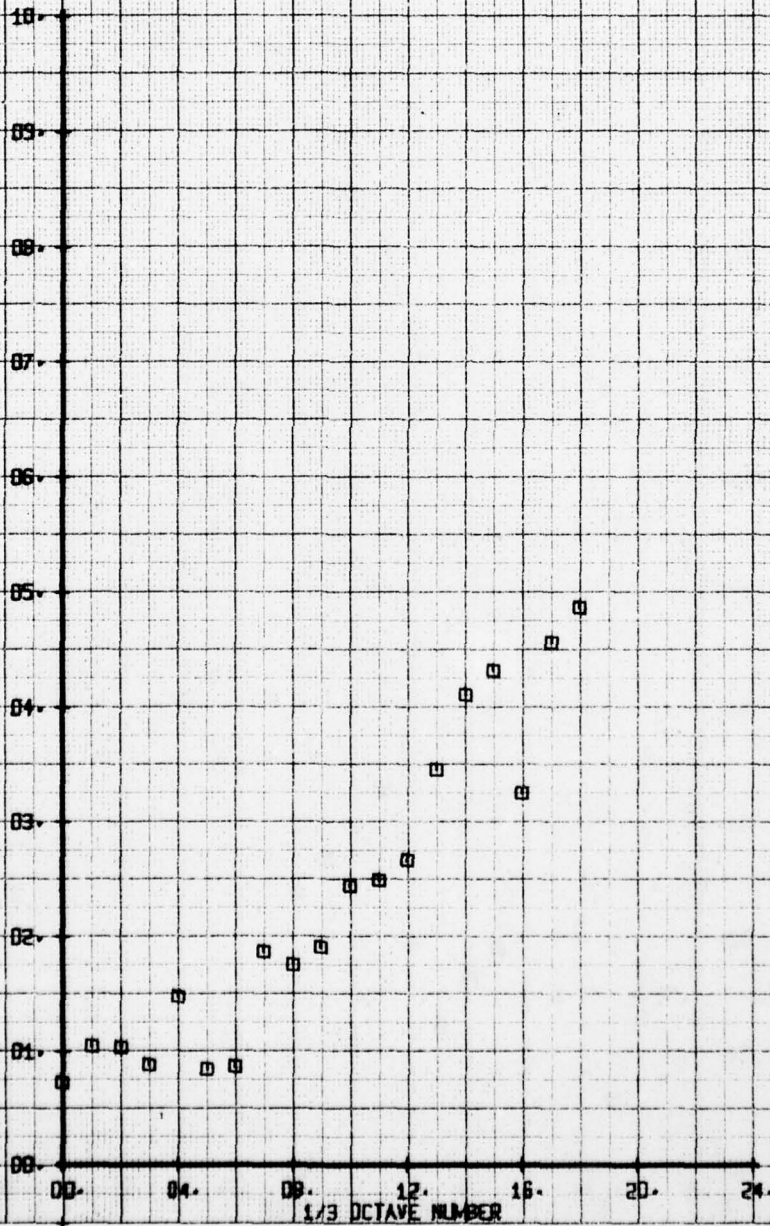
SVM	CH	PARAMETER
0	71	VEL-3RT



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/L-BLADES OFF, HUB OFF  
 RUN 159 TP 5

LEGEND		
SYM	CH	PARAMETER
□	71	VEL-3RT

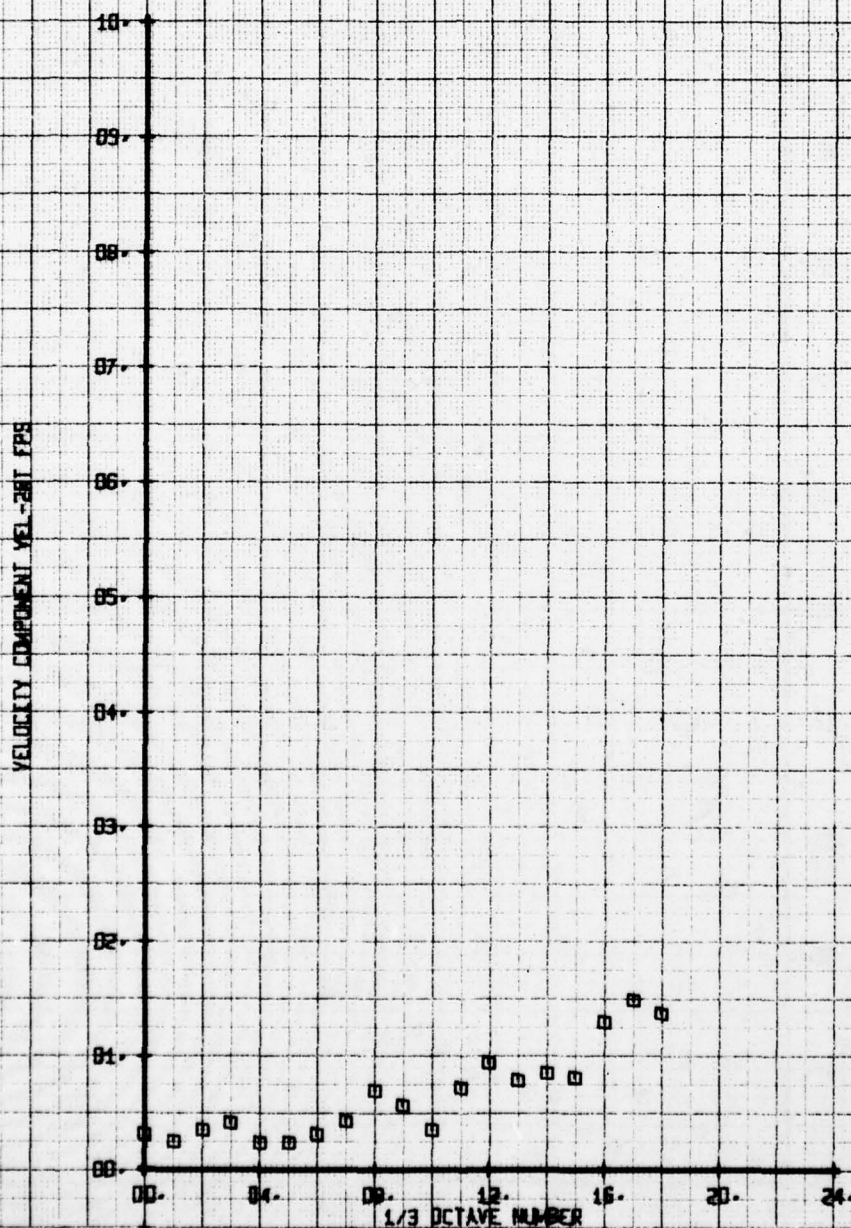
VELOCITY COMPONENT VEL-3RT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/L-BLADES OFF, HUB OFF  
 RUN 159 TP 2

SYM	CH	PARAMETER
□	75	VEL-2RT





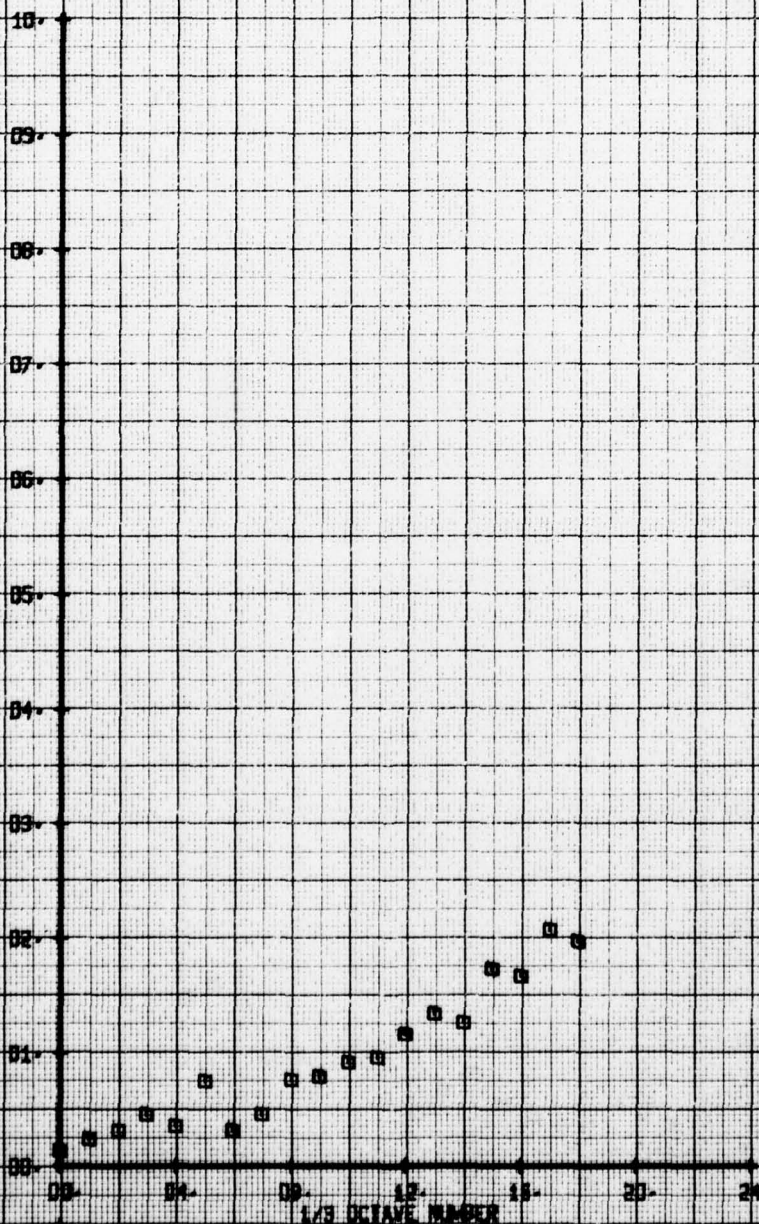
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-BLADES OFF, HUB OFF  
 RUN 159 TP 2

SYM  
 □

CN  
 75

LEGEND  
 PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS



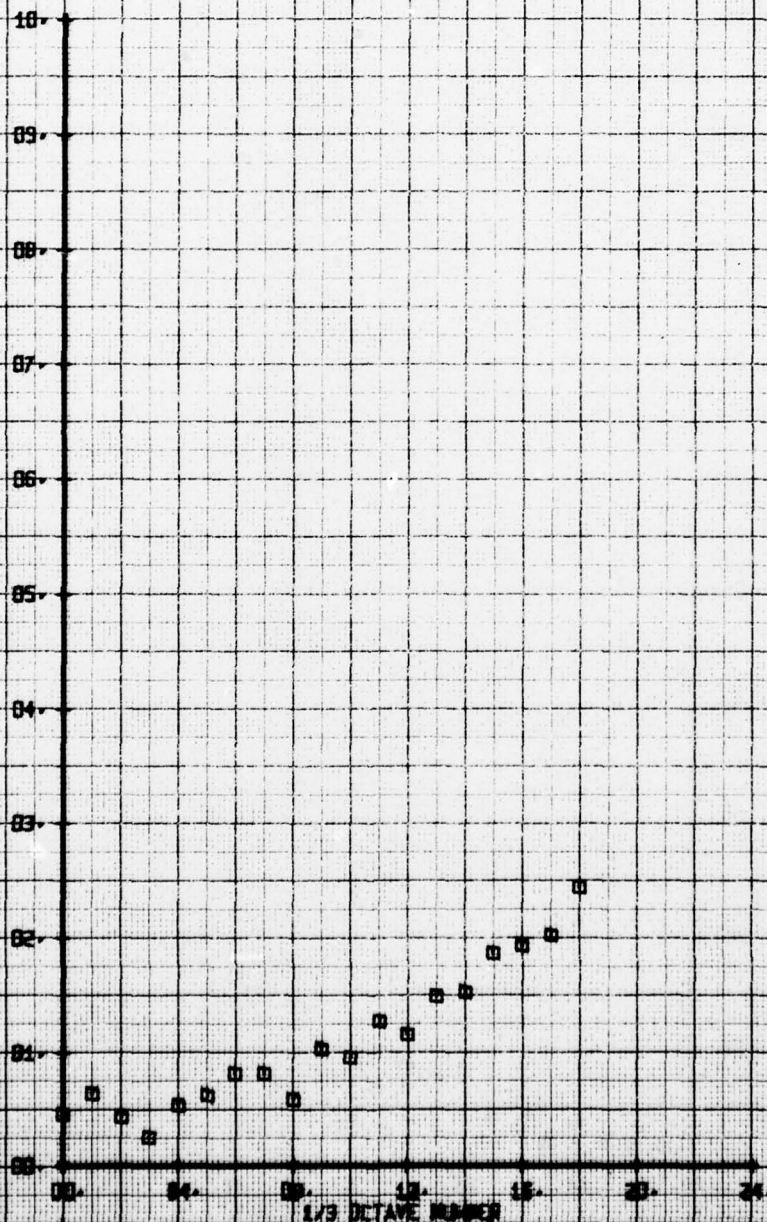
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 841-BLADES OFF, HUB OFF  
 RUN 159 TP 3

SYM  
 0

CH  
 75

LEGEND  
 PARAMETER  
 VEL-2RT

VELOCITY COMPONENT VEL-2RT FPS

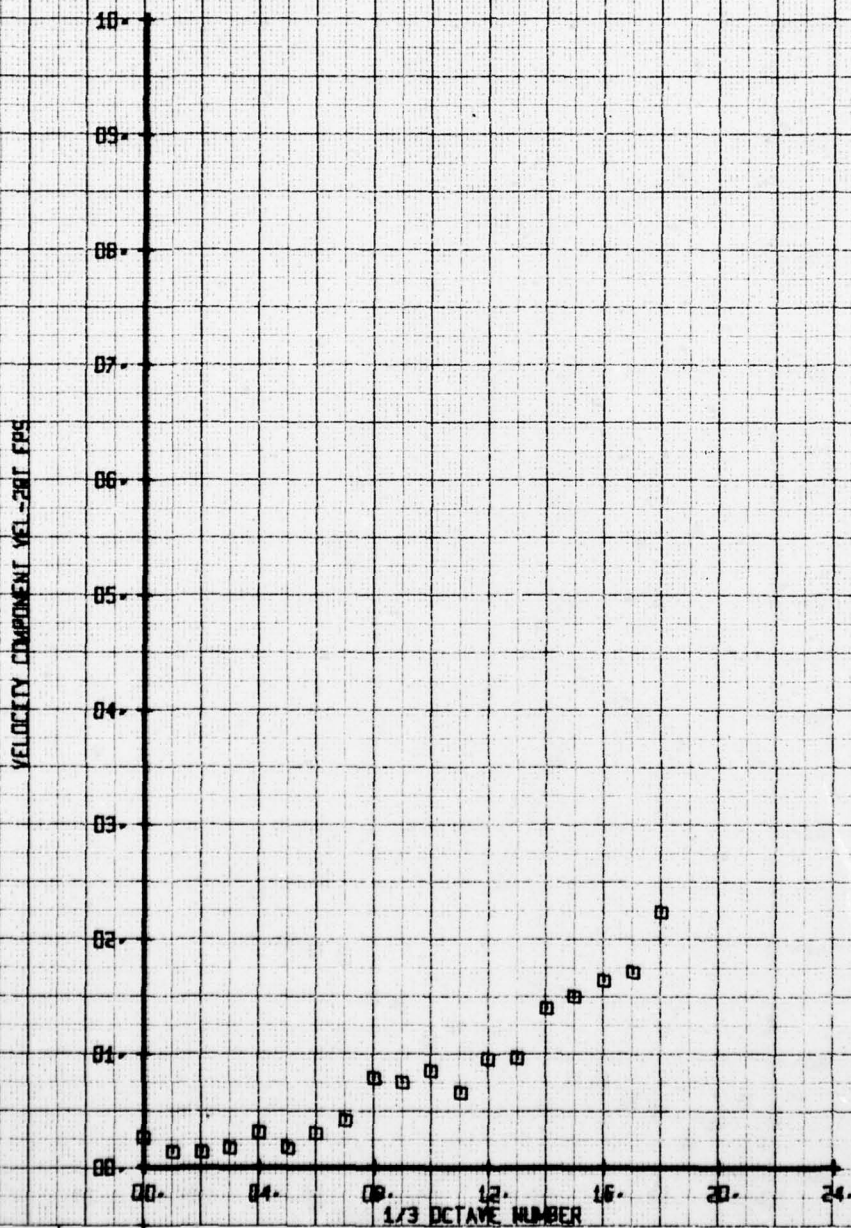


HOT FILM WARE 1/3 OCTAVE ANALYSIS  
 BASELINE BAL-BLADES OFF, HUB OFF  
 RUN 159 TP 4

SYM  
 0

CH  
 75

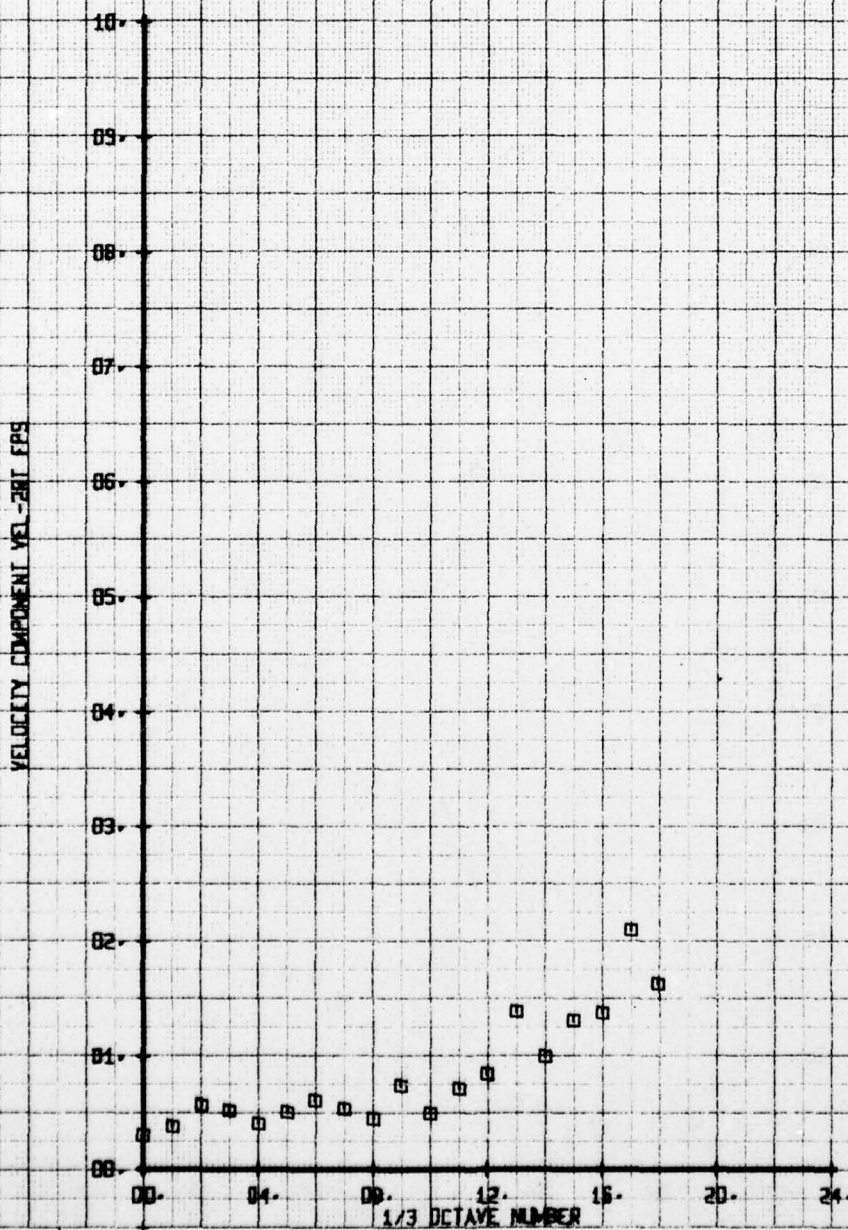
LEGEND  
 PARAMETER  
 VEL-2RT





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/1-BLADES OFF, HUB OFF  
 RUN 159 TP 5

LEGEND  
 CH 75  
 PARAMETER  
 VEL-2RT





NOT FILM WARE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-MADES OFF, HUB OFF  
 RUN 159 TP 1

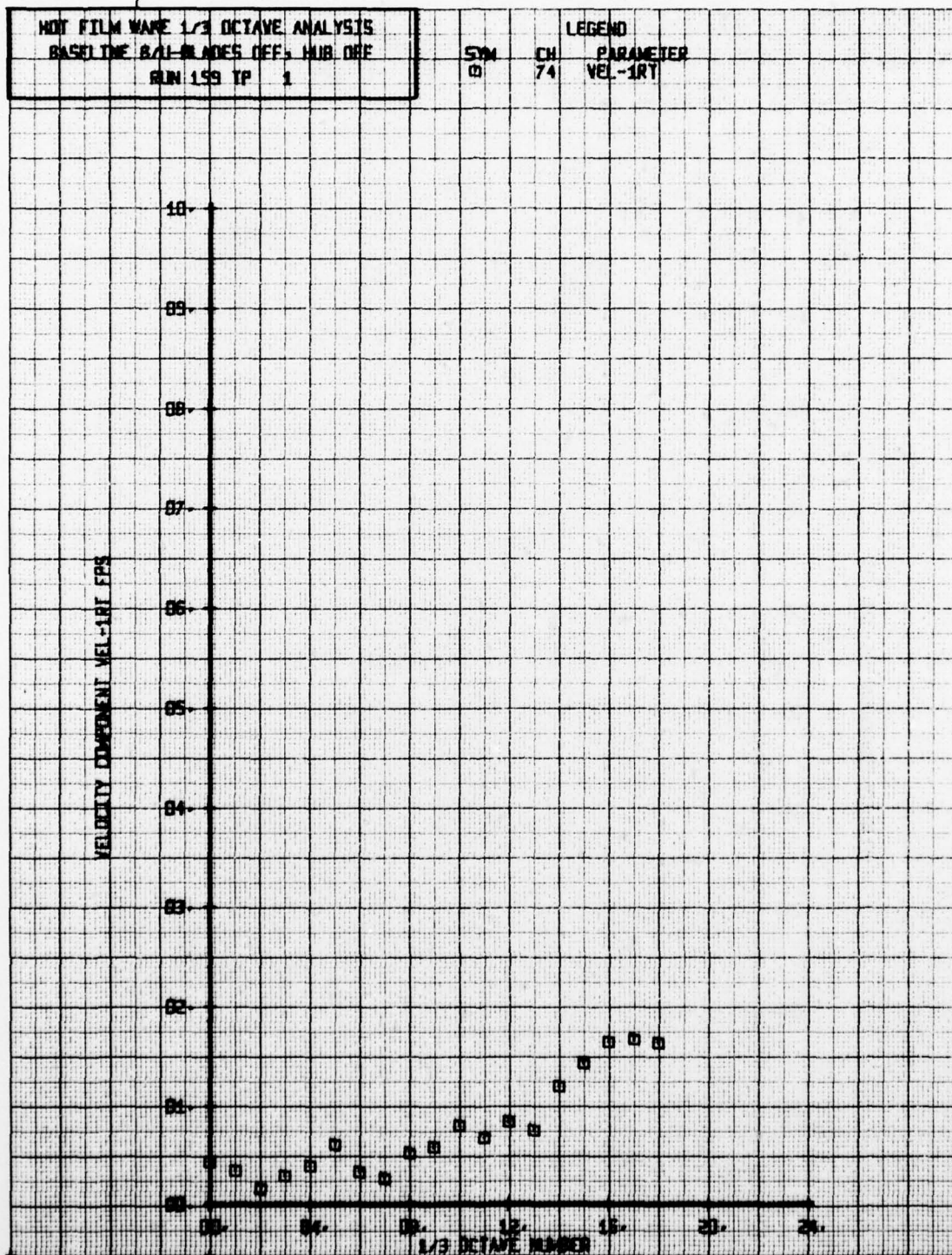
SYM  
 0

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS

1/3 OCTAVE NUMBER



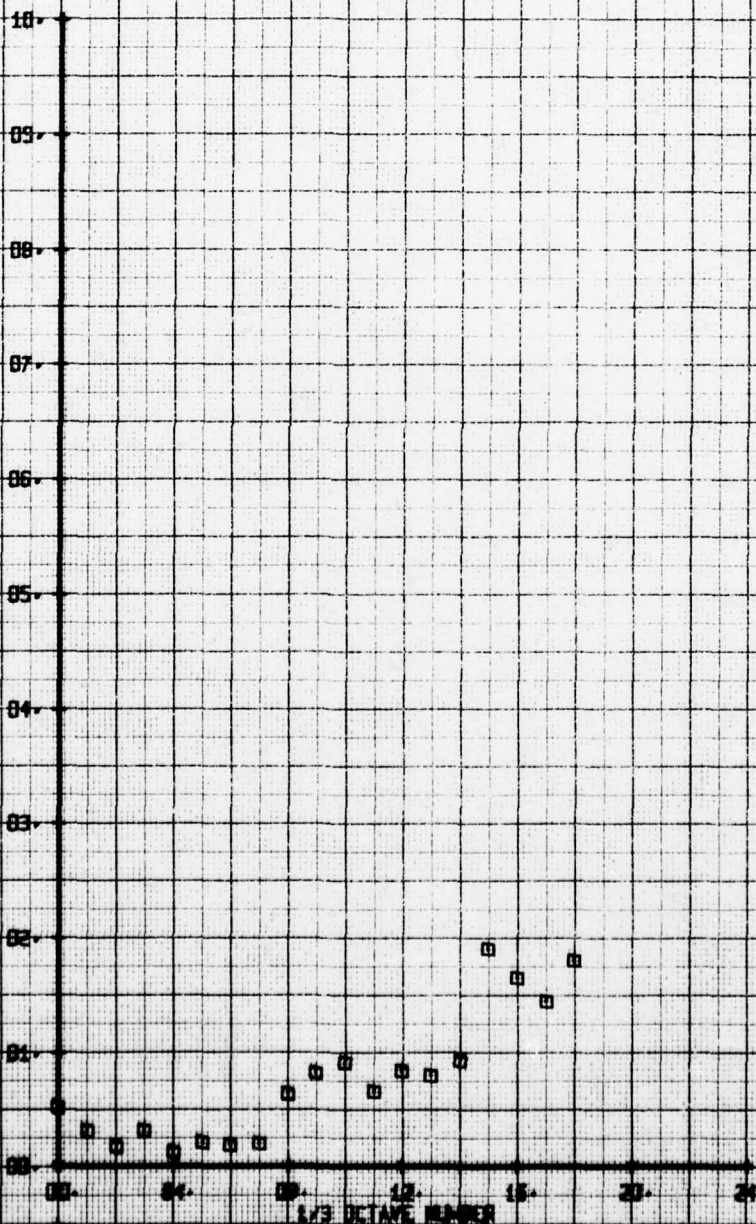
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 841-BLADES OFF, HUB OFF  
 RUN 159 TP 2

SYM  
 □

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS



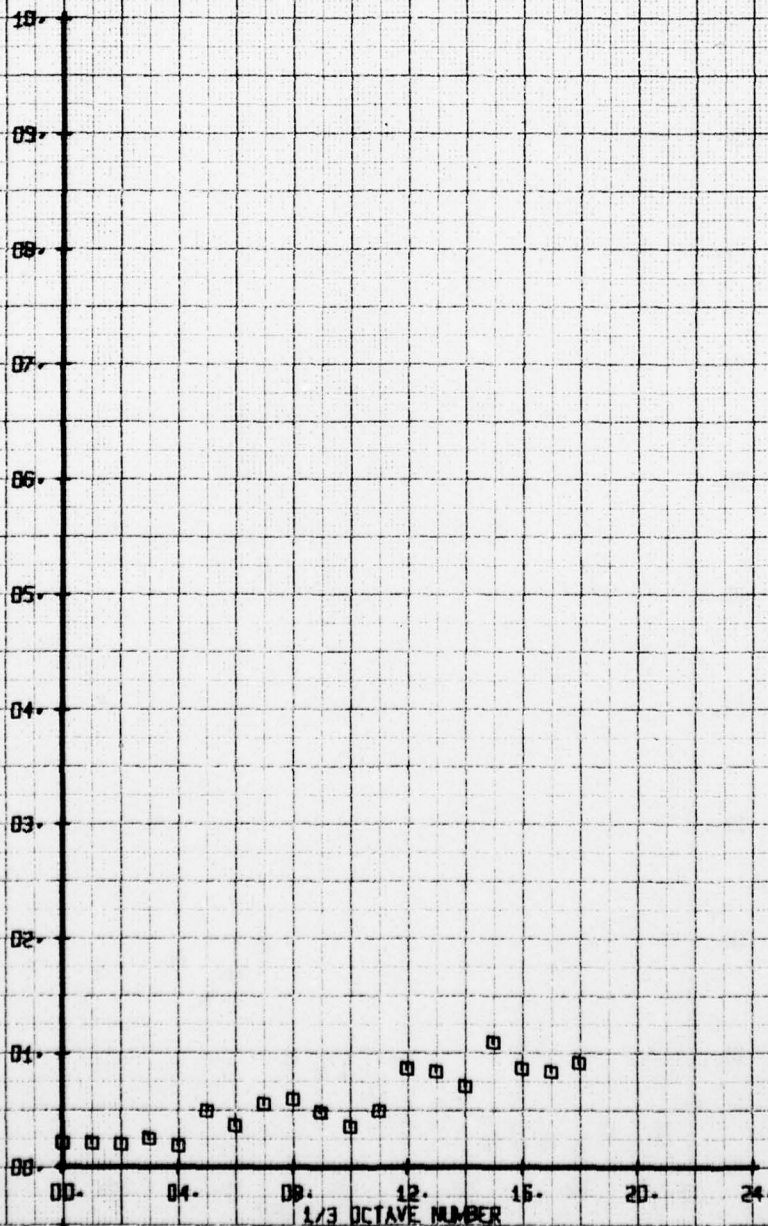
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11 BLADES OFF, HUB OFF  
 RUN 159 TP 3

SYM  
 0

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

VELOCITY COMPONENT VEL-1RT FPS





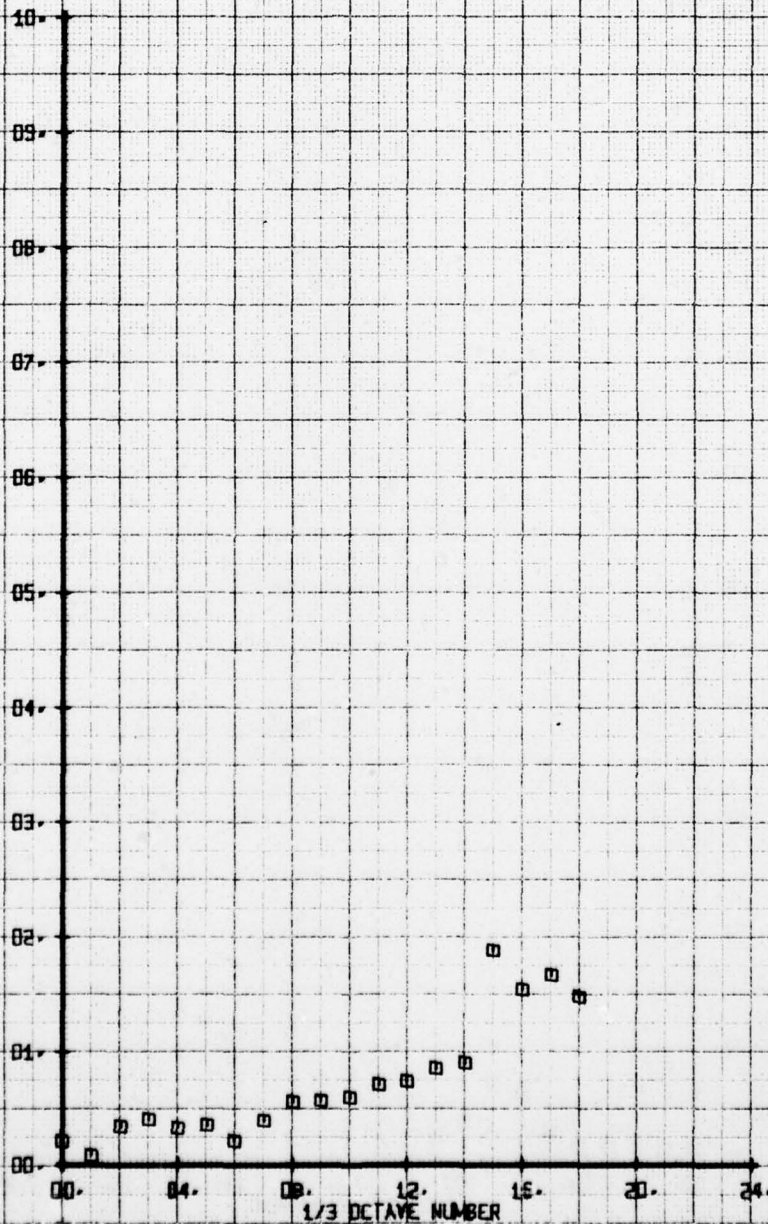
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/A-BLADES OFF, HUB OFF  
 RUN 159 TP 4

SYM  
 0

CH  
 74

LEGEND  
 PARAMETER  
 VEL-1RT

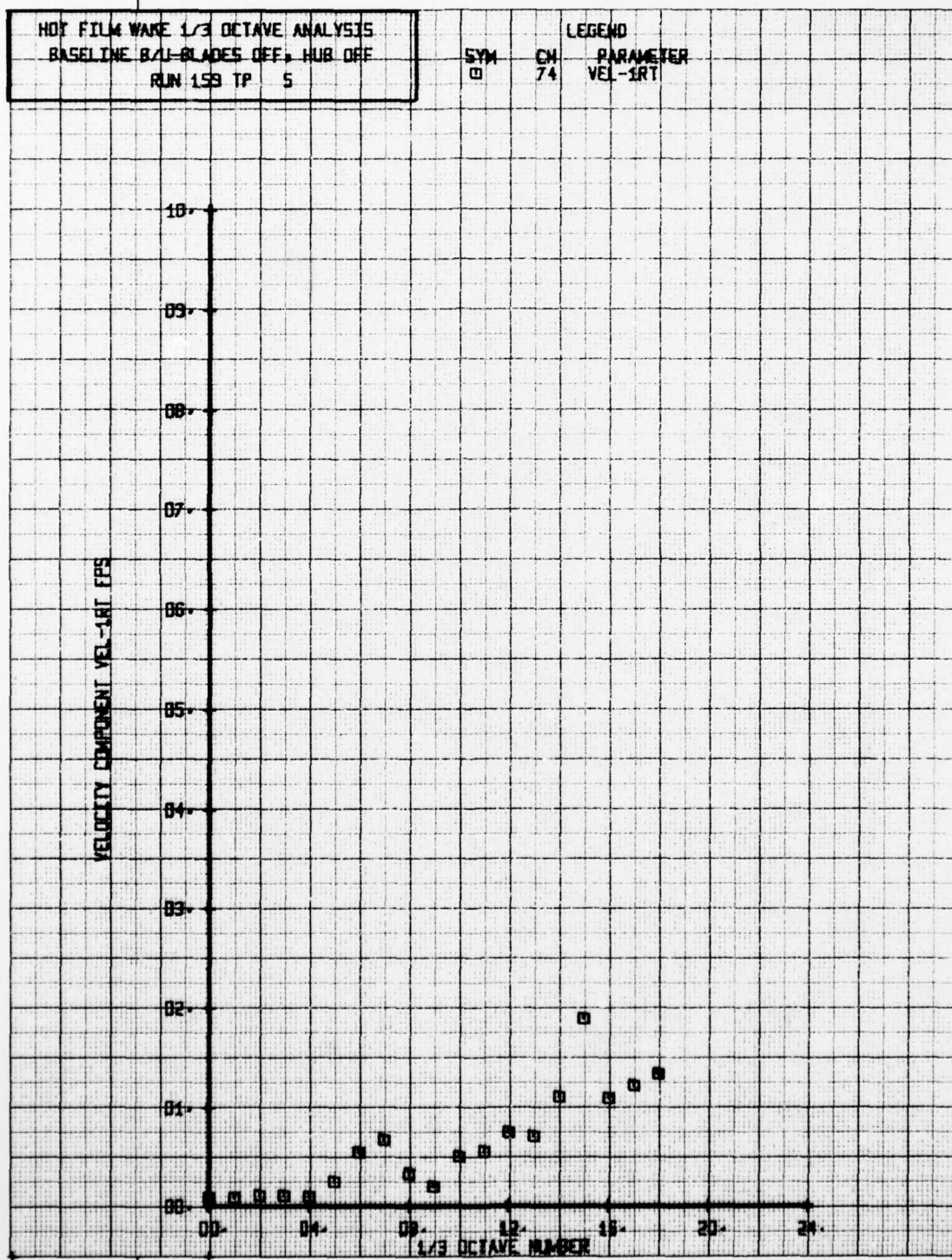
VELOCITY COMPONENT VEL-1RT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, HUB OFF  
 RUN 159 TP 5

SYM	CH	LEGEND
□	74	PARAMETER VEL-1RT



AD-A061 994

BOEING VERTOL CO PHILADELPHIA PA

F/6 1/3

INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONF--ETC(U)

SEP 78 P F SHERIDAN

DAAJ02-77-C-0020

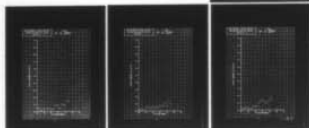
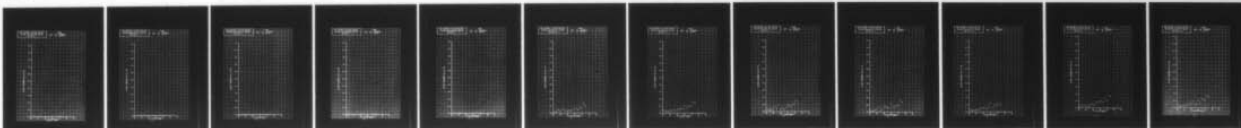
UNCLASSIFIED

USARTL-TR-78-23F

NL

4 OF 4

AD  
A061994



END

DATE  
FILMED

3-79

DDC

HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE 8/1-BLADES OFF, HUB OFF  
RUN 158 TP 1

SYM  
□

CH  
73

LEGEND  
PARAMETER  
VEL-ILT

VELOCITY COMPONENT VEL-ILT FPS

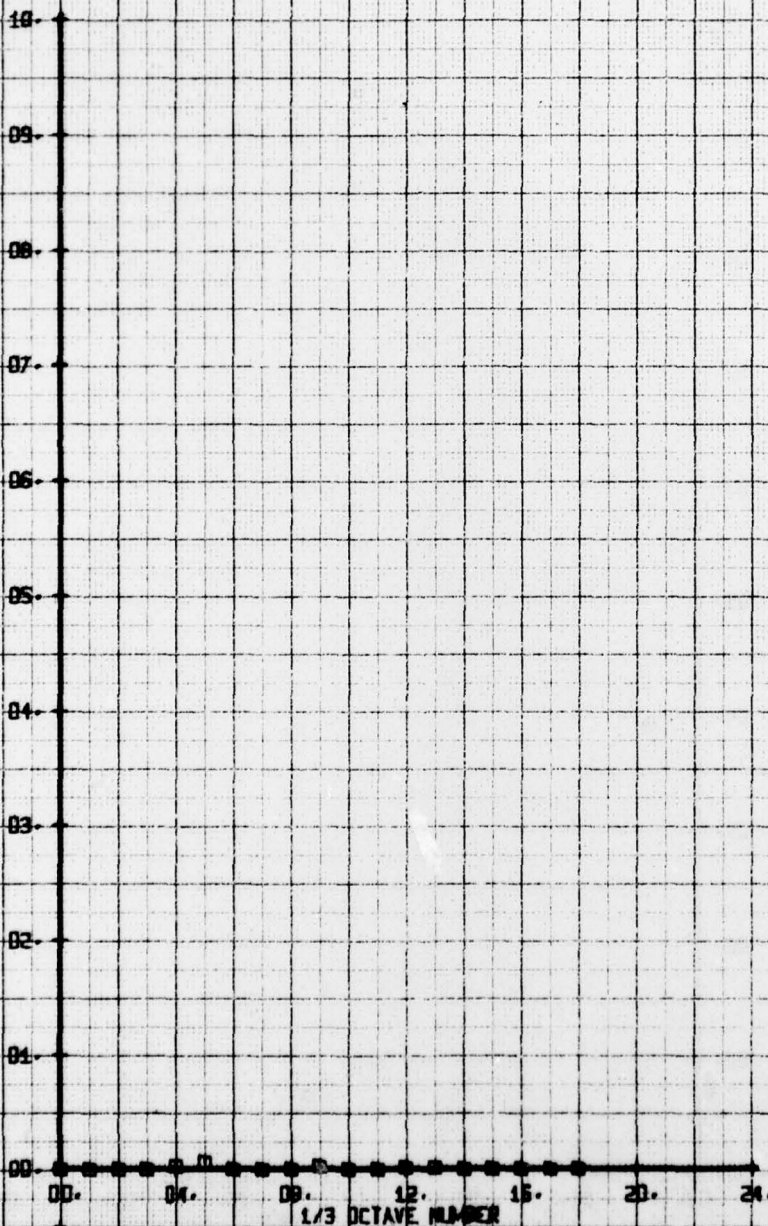
10  
09  
08  
07  
06  
05  
04  
03  
02  
01  
00

00 04 08 12 16 20 24  
1/3 OCTAVE NUMBER

HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/LI-BLADES OFF, HUB OFF  
 RUN 159 TP 2

LEGEND		
SYM	CH	PARAMETER
□	73	VEL-1LT

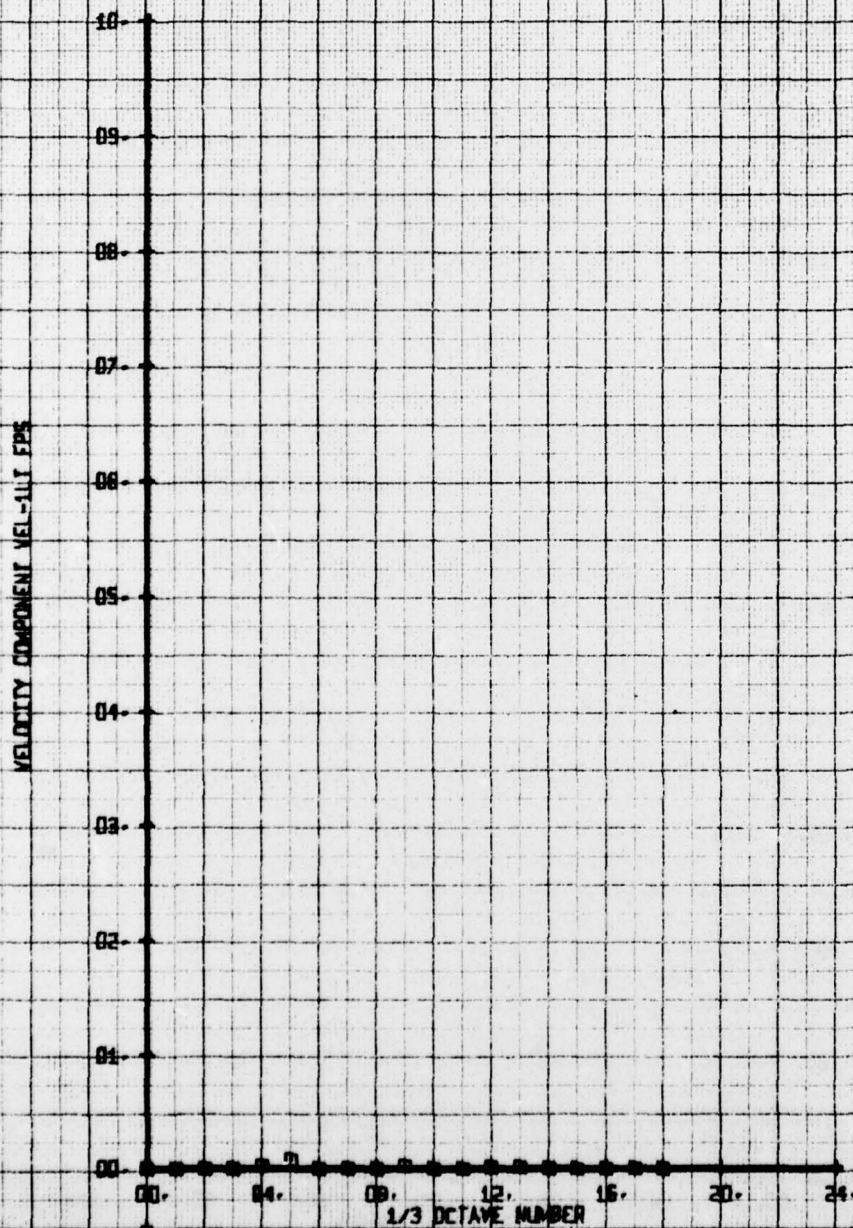
VELOCITY COMPONENT VEL-1LT FPS





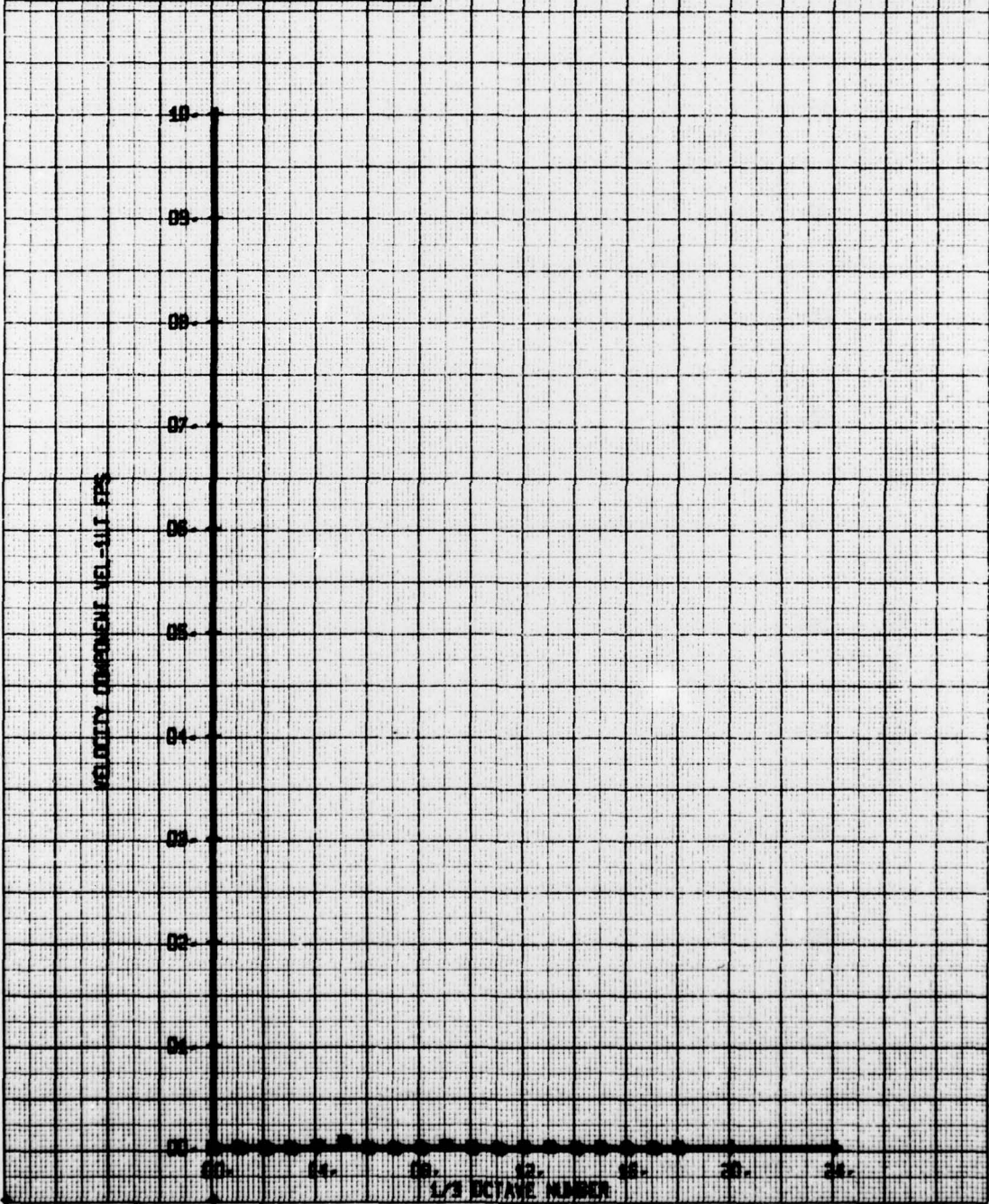
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-BLADES OFF, HUB OFF  
 RUN 159 TP 3

LEGEND	
SYM	CH
0	79
PARAMETER	
VEL-1LT	



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/10-BLADES OFF, NUM OFF  
 RUN 159 TP 4

LEGEND		
SYM	CH	PARAMETER
□	73	VEL-1LT

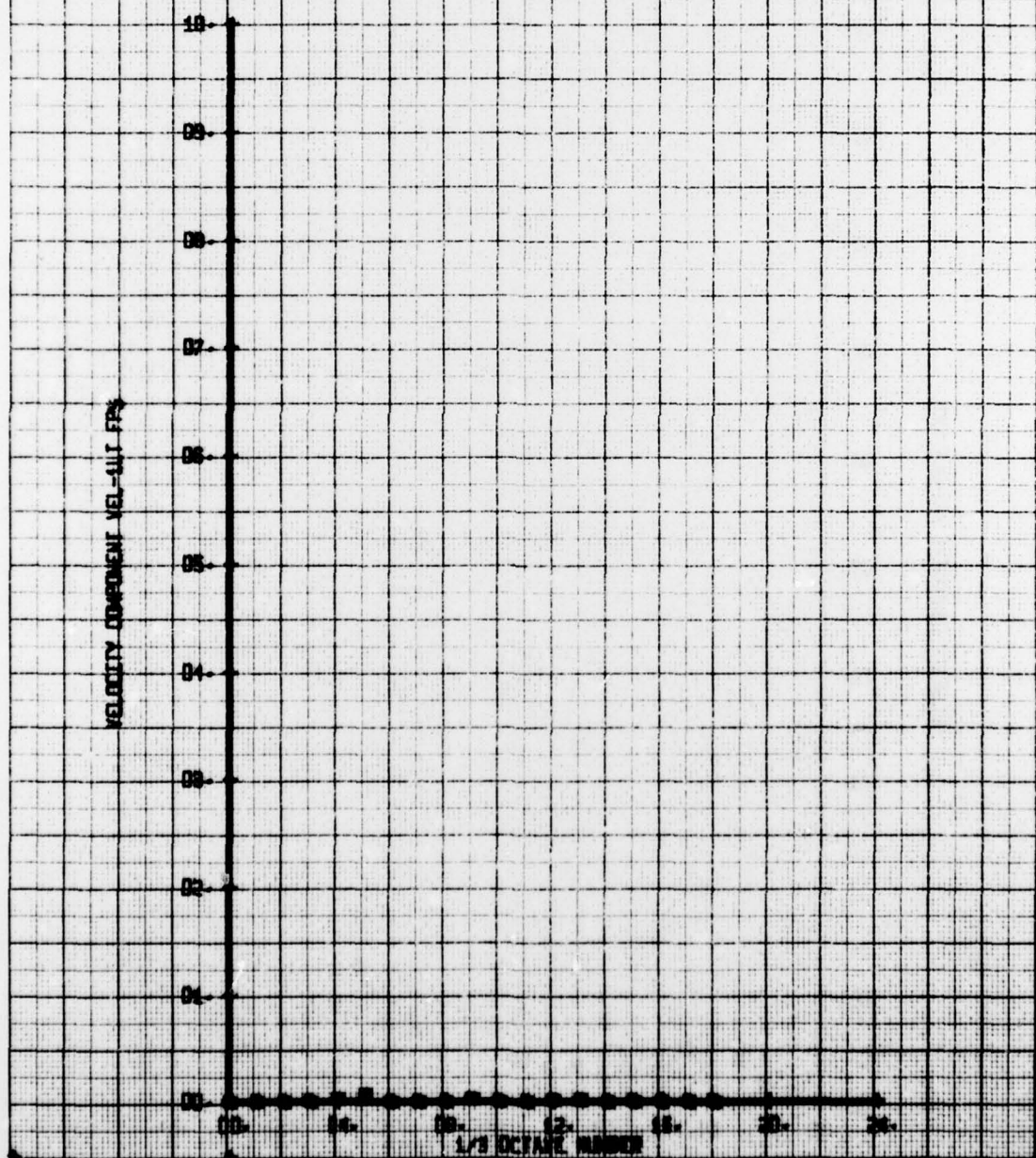


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B-11-BLADES OFF, WAKE OFF  
 RUN 159 TP 5

SYM  
 01

CH  
 73

LEGEND  
 PARAMETER  
 VEL-111





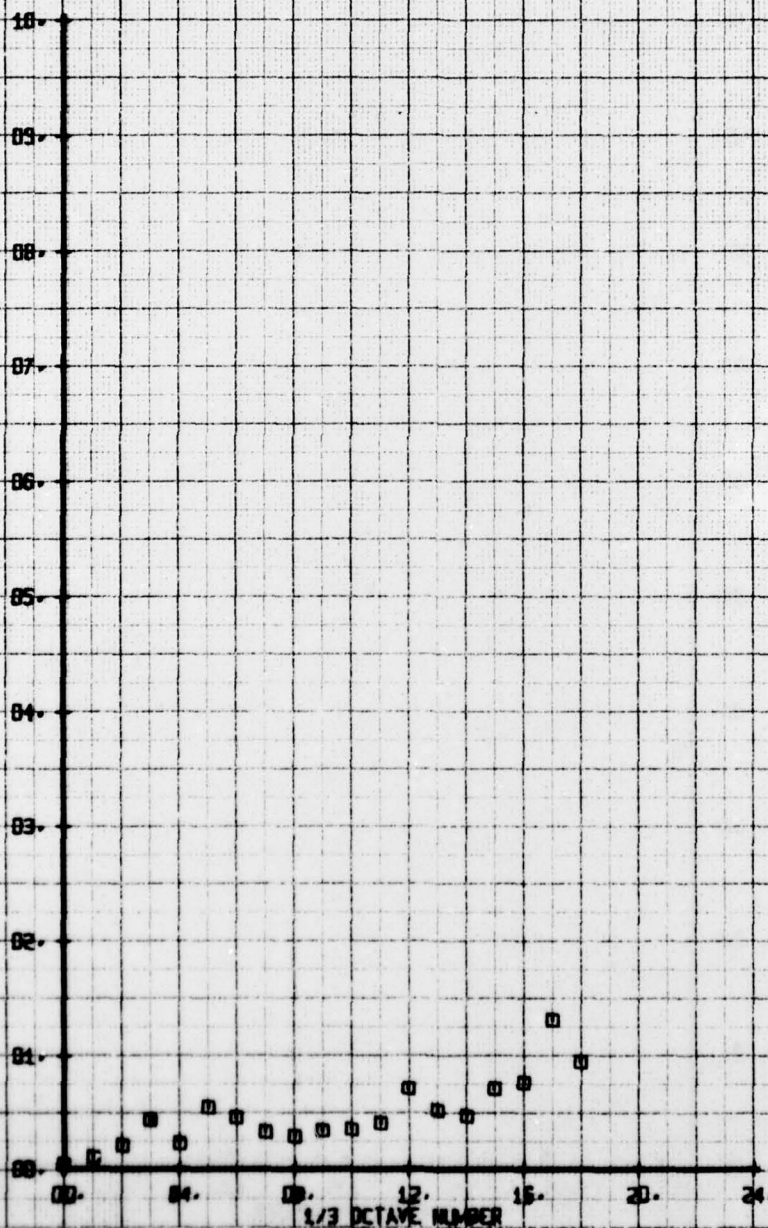
HOT FILM WAVE 1/3 OCTAVE ANALYSIS  
BASELINE 8/1-BLADES OFF, HUB OFF  
RUN 199 TP 1

SYM  
0

CH  
72

LEGEND  
PARAMETER  
VEL-ZLT

VELOCITY COMPONENT VEL-ZLT FPS



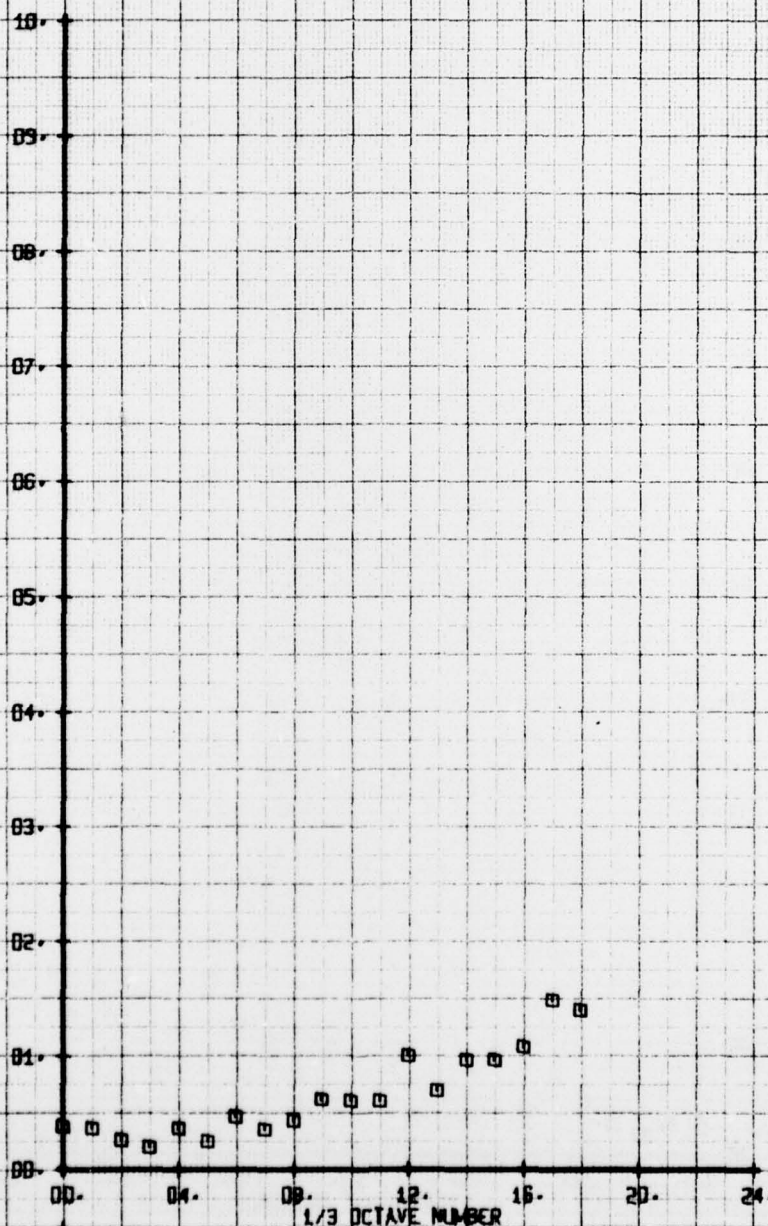


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-BLADES OFF, HUB OFF  
 RUN 159 TP 2

SYM  
 □

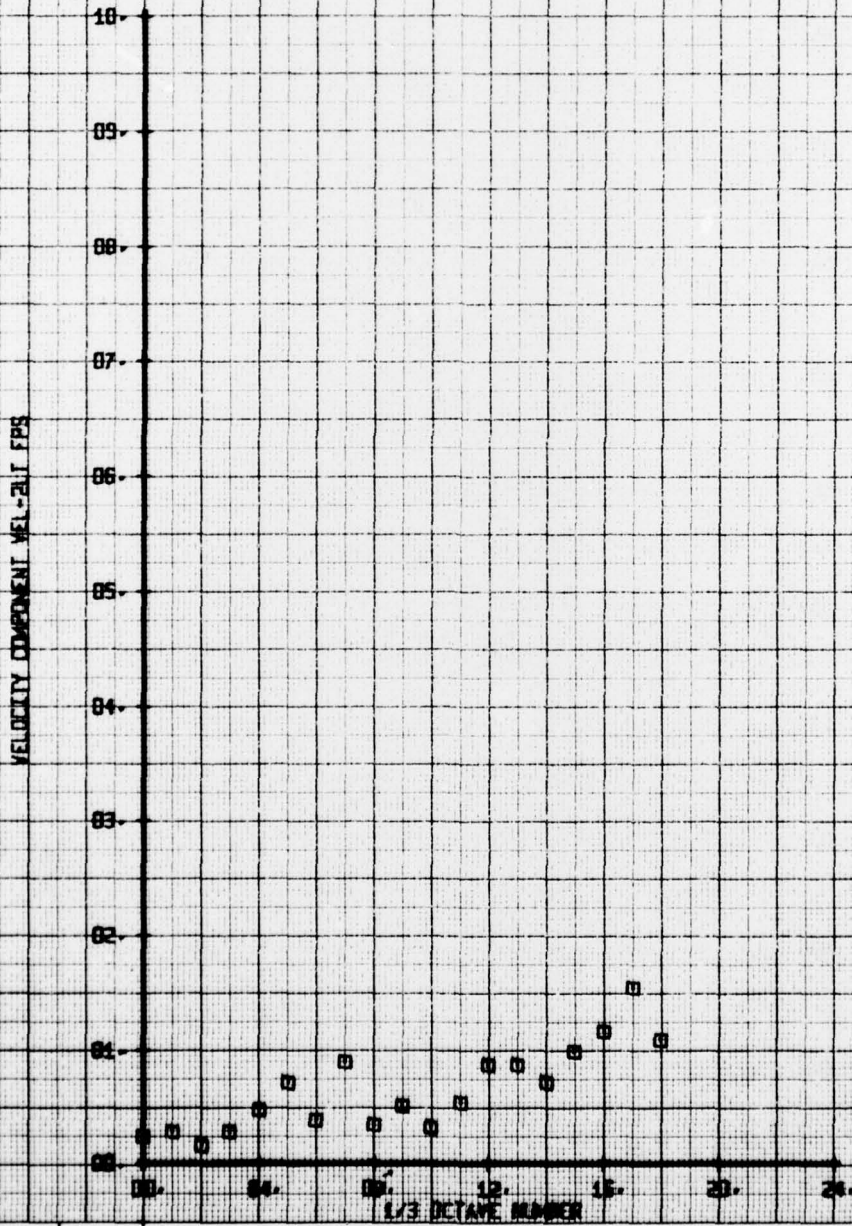
LEGEND  
 CH 72  
 PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE B/LI-BLADES OFF, HUB OFF  
 RUN 159 TP 3

SYM	CH	PARAMETER
□	72	VEL-2LT



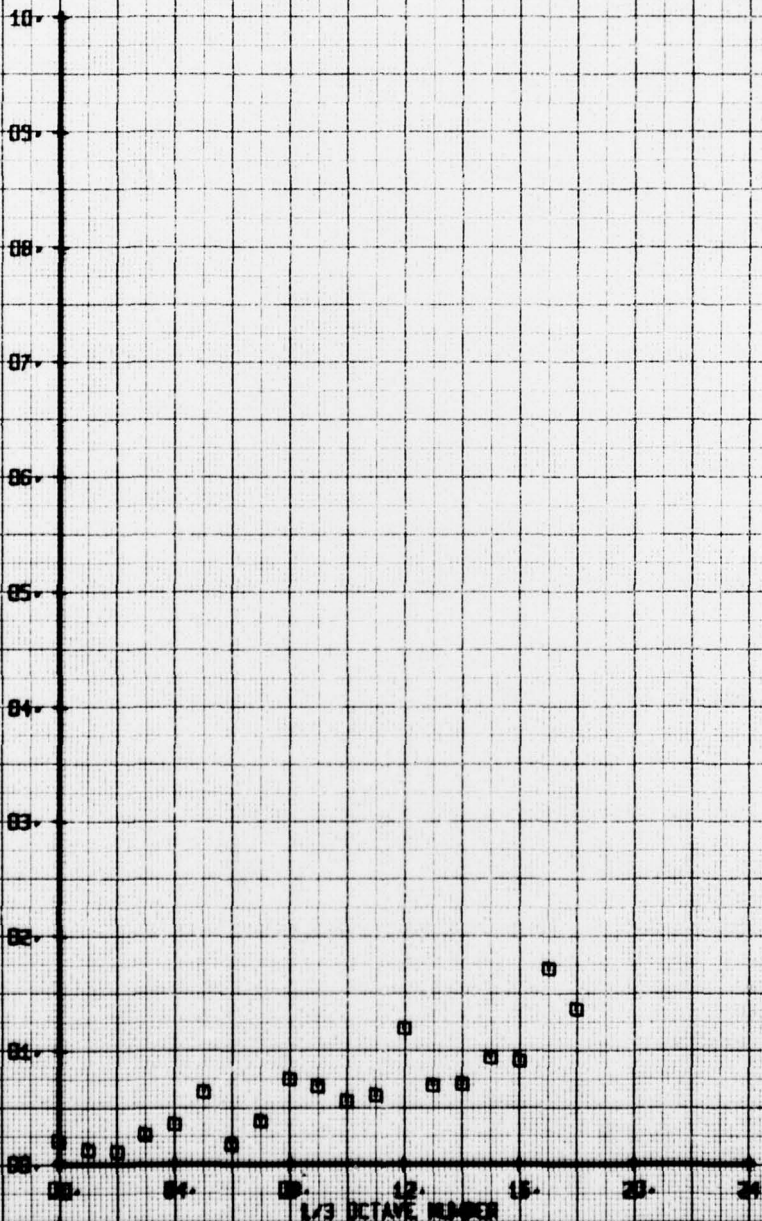
HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-BLADES OFF, HUB OFF  
 RUN 159 TP 4

SYM  
 0

CH  
 72

LEGEND  
 PARAMETER  
 VEL-2LT

VELOCITY COMPONENT VEL-2LT FPS



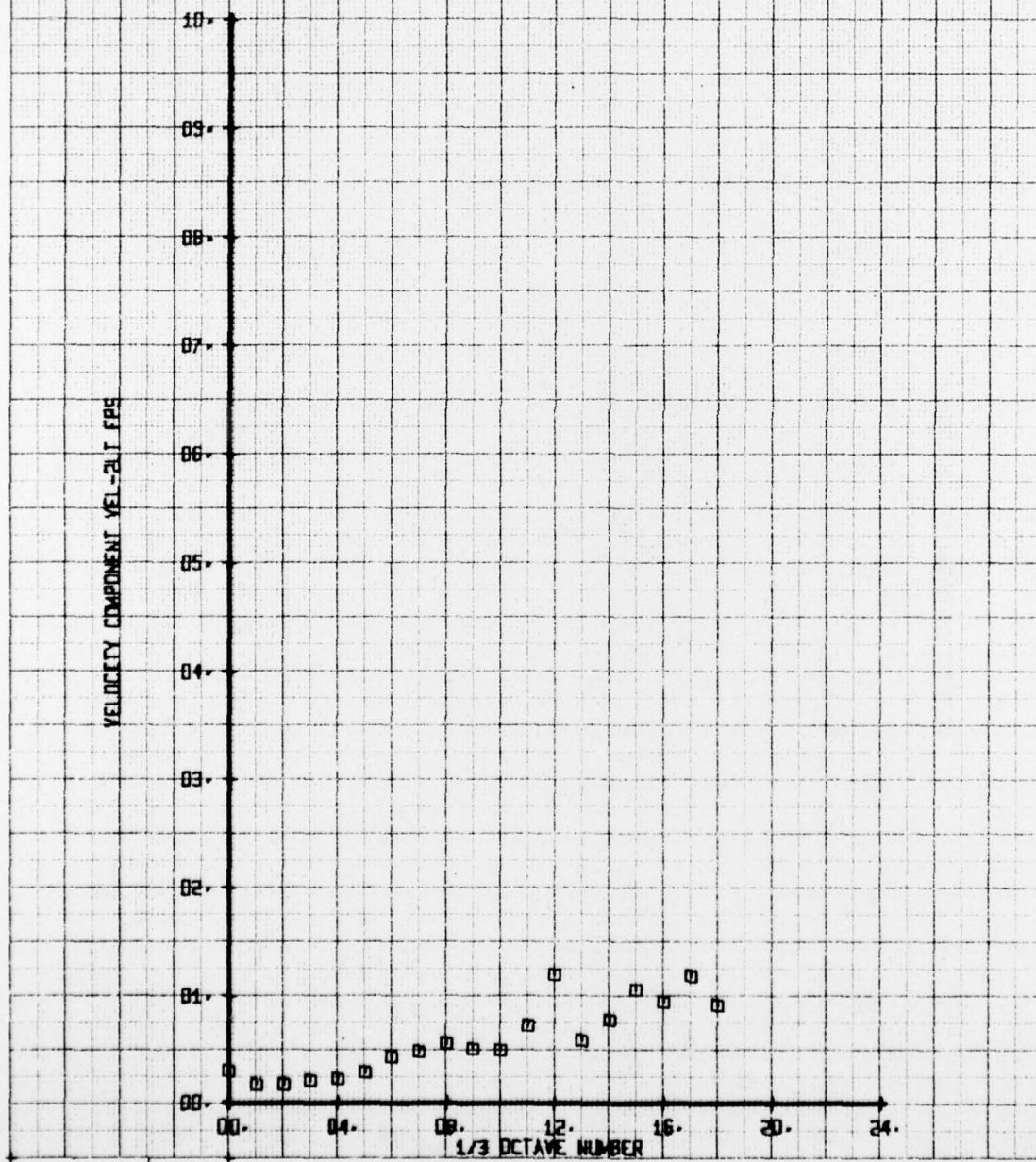


HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
BASELINE BLU-BLADES OFF, HUB OFF  
RUN 159 TP 5

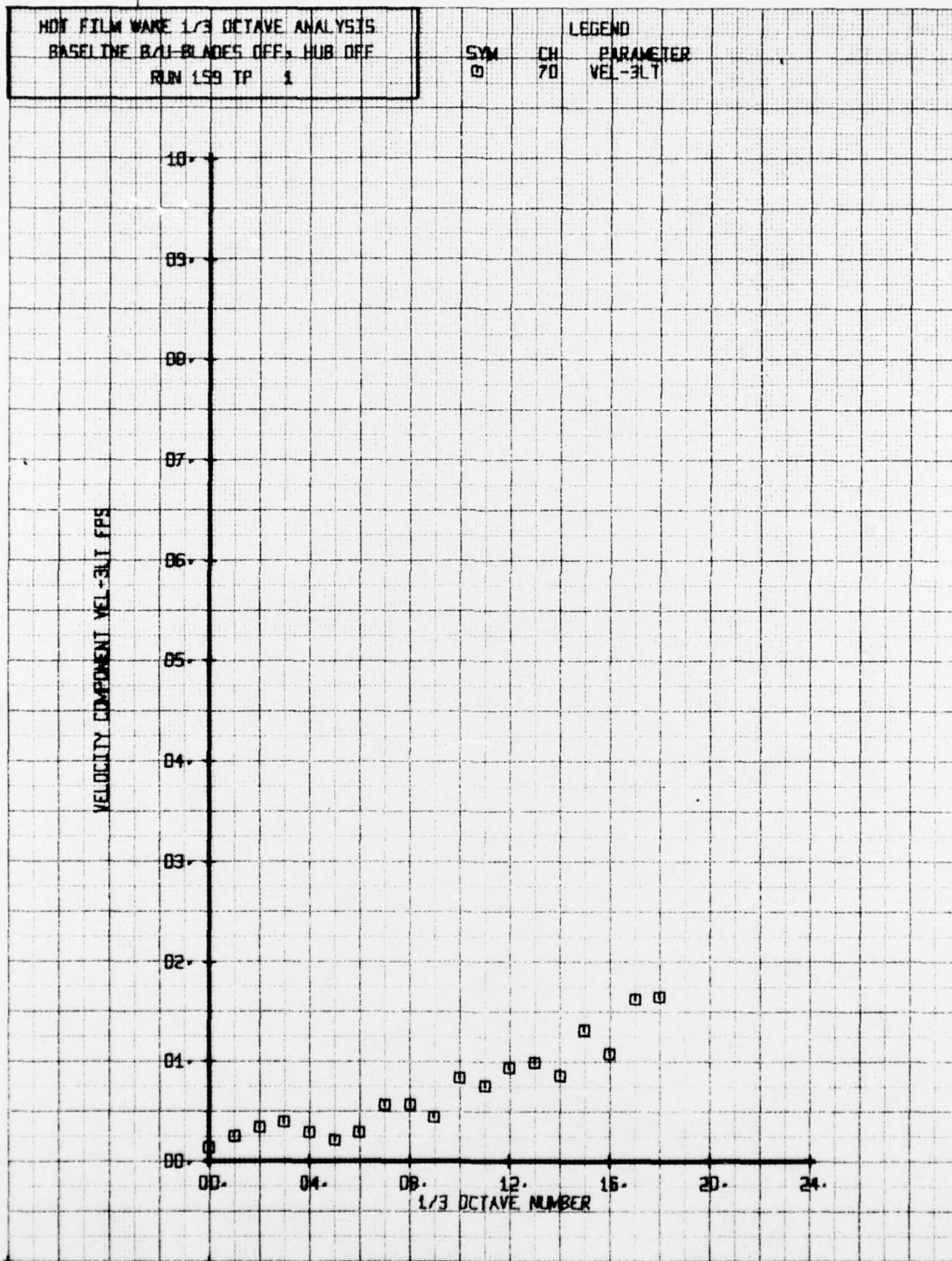
SYM  
□

CH  
72

LEGEND  
PARAMETER  
VEL-2LT







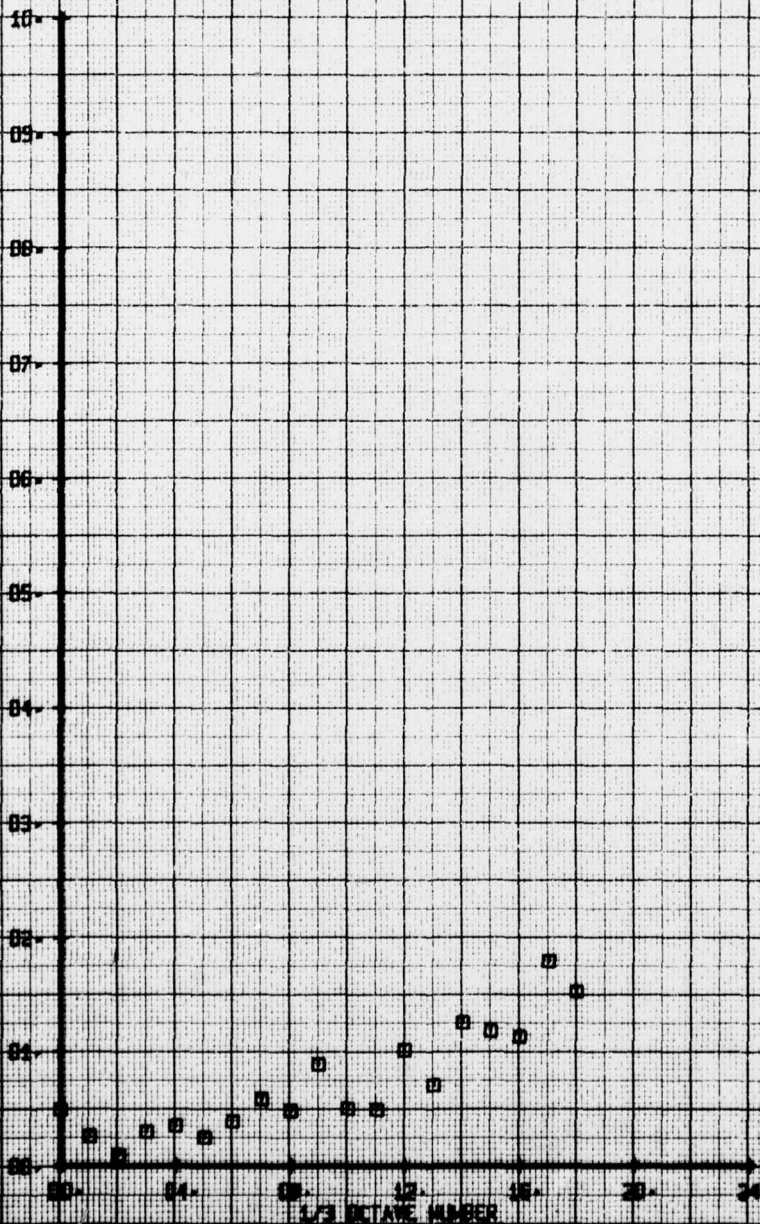
NOT FILM WARE 1/3 OCTAVE ANALYSIS  
 BASELINE B/U-BLADES OFF, HUB OFF  
 RUN 159 TP 2

SYM  
 0

CH  
 70

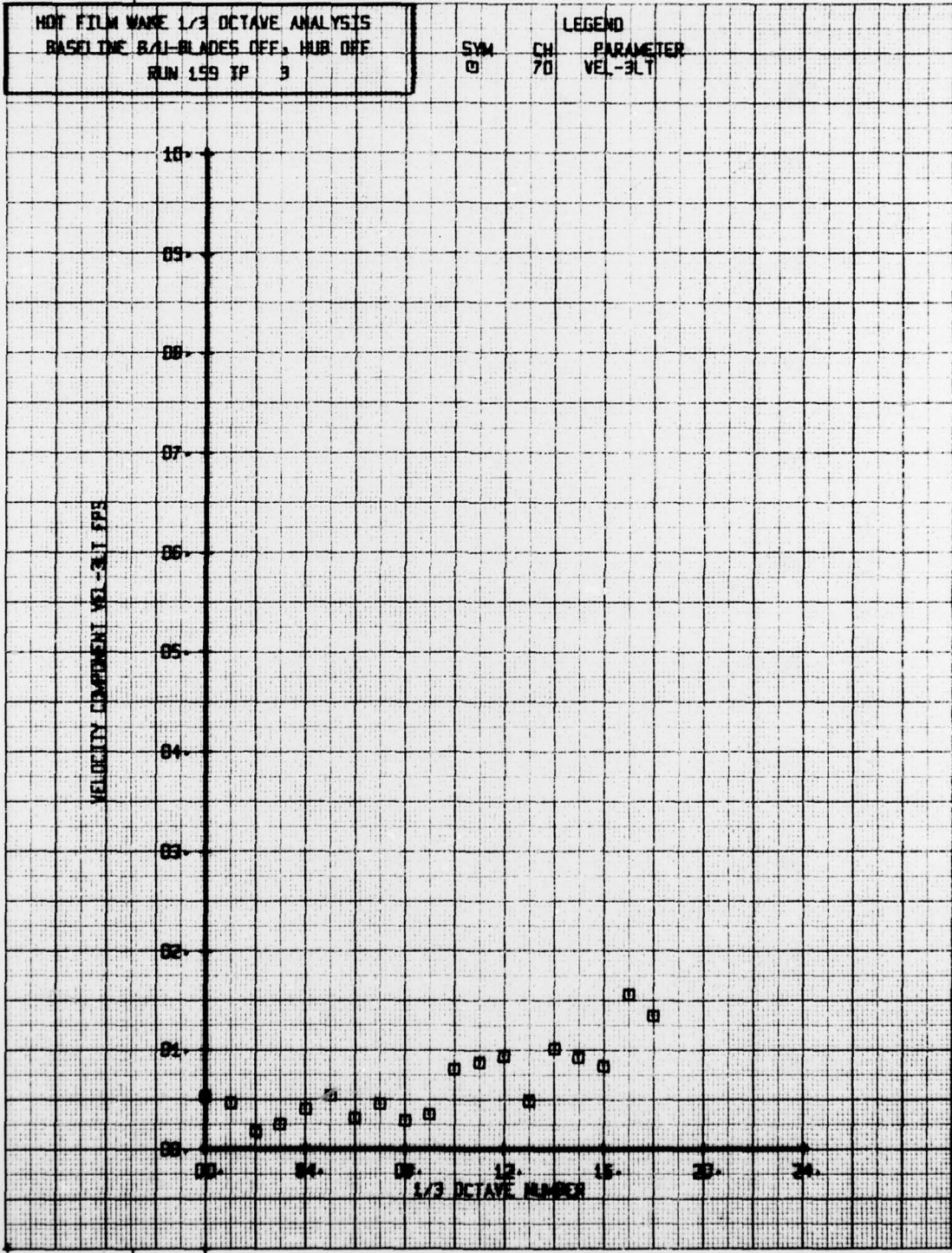
LEGEND  
 PARAMETER  
 VEL-3LT

VELOCITY COMPONENT VEL-3LT FPM



HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 8/11-BLADES OFF, HUB OFF  
 RUN 159 IP 3

LEGEND	
SYM	CH
0	70
	PARAMETER
	VEL-3LT

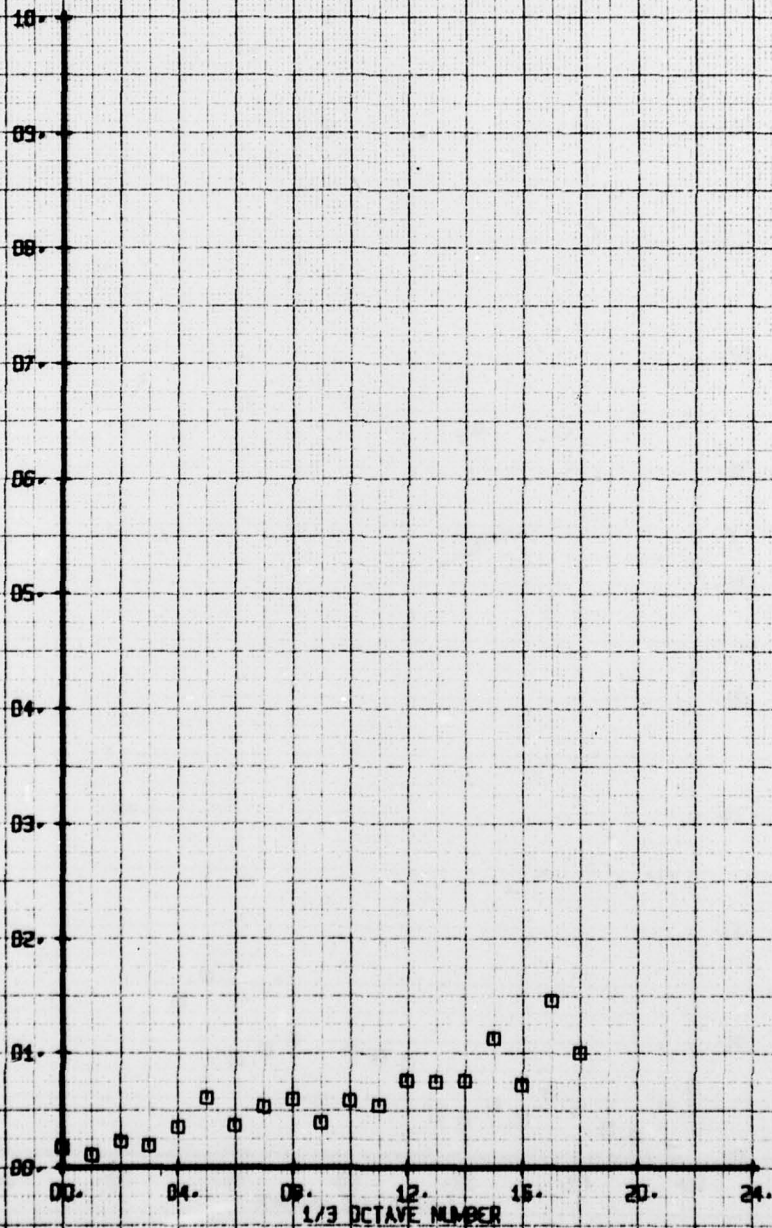




HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE 841-BLADES OFF, HUB OFF  
 RUN 159 TP 4

LEGEND		
SYM	CH	PARAMETER
□	70	VEL-3LT

VELOCITY COMPONENT VEL-3LT FPS





HOT FILM WAKE 1/3 OCTAVE ANALYSIS  
 BASELINE RAU-BLADES OFF, HUB OFF  
 RUN 199 TP 5

SVM	CH	PARAMETER
0	70	VEL-3LT

